

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES	
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. <i>(If applicable)</i>	
6. ISSUED BY		CODE		7. ADMINISTERED BY <i>(If other than Item 6)</i>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR <i>(No., street, county, State and ZIP Code)</i>				(X)		9A. AMENDMENT OF SOLICITATION NO.	
						9B. DATED <i>(SEE ITEM 11)</i>	
						10A. MODIFICATION OF CONTRACT/ORDER NO.	
						10B. DATED <i>(SEE ITEM 11)</i>	
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers
☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. **FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.** If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

**13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: <i>(Specify authority)</i> THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES <i>(such as changes in paying office, appropriation date, etc.)</i> SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER <i>(Specify type of modification and authority)</i>

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copy to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER <i>(Type or print)</i>		16A. NAME AND TITLE OF CONTRACTING OFFICER <i>(Type or print)</i>	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
_____ <i>(Signature of person authorized to sign)</i>		_____ <i>(Signature of Contracting Officer)</i>	

Item 14. Continued.

CHANGES TO WAGE RATES AND AFFIRMATIVE ACTION PLAN

1. Wage Rates.- Replace wage rate pages 00710-1 through 00710-9 with the attached pages 00710-1 through 00710-9, each page bearing the notation "ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-03-B-0004."

CHANGES TO THE SPECIFICATIONS

2. New Sections - Add the following accompanying new sections, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-03-B-0004," and add to the Table of Contents:

02532A	FORCE MAINS AND INVERTED SIPHONS; SEWER
13110A	CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE)

3. Replacement Sections - Replace the following sections with the accompanying new sections of the same number and title, bearing the notation "ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-03-B-0004:"

01000	CONSTRUCTION SCHEDULE
01320A	PROJECT SCHEDULE*
01421	BASIC STORM WATER POLLUTION PREVENTION PLAN**
01451	CONTRACTOR QUALITY CONTROL
01500	TEMPORARY CONSTRUCTION FACILITIES
01520	GOVERNMENT FIELD OFFICE
02510A	WATER DISTRIBUTION SYSTEM***
02531	SANITARY SEWERS
12320A	CABINETS AND COUNTERTOPS
15400A	PLUMBING, GENERAL PURPOSE****

*Change is on page 6

**Change is to paragraph 11.1

***Changes are to paragraphs 2.1.2 and 2.1.3

****Changes are to paragraphs 1.1, 1.5.1 and 3.10

CHANGES TO THE DRAWINGS

4. New Drawings.- The new drawings listed below which accompany this amendment, bearing the notation "AM #0002" shall be added to and become a part of the contract documents:

M5-44.cal	M5-44 PLUMBING WATER RISER DIAGRAMS SHEET 1 OF 2
M5-45.cal	M5-45 PLUMBING WATER RISER DIAGRAMS SHEET 2 OF 2

5. Replacement Drawings.- Replace the drawings listed below with the attached new drawings of the same number, bearing the notation "AM #0002":

G0-02.cal	G0-02 DRAWING INDEX
C1-05.cal	C1-05 SITE PLAN - VISITOR CONTROL CENTER
C1-09.cal	C1-09 DEMOLITION AND SITE PLANS - GATE 5 - EAST RANGE ROAD

C1-21.cal	C1-21 ENLARGED SITE PLAN - GATE 9A - CLARKE ROAD
C5-22.cal	C5-22 DETAILS MISCELLANEOUS CONCRETE
C4-28.cal	C4-28 ENLARGED SITE LAYOUT - MAIN GATE
C4-32.cal	C4-32 ENLARGED SITE LAYOUT - GATE 9 - CLARKE ROAD (NORTH)
C5-42.cal	C5-42 DETAILS - STORMWATER PIPING AND DETAILS - SHEET 1 OF 2
M1-07.cal	M1-07 "SANITARY SEWER SERVICE PLAN AND PROFILE- ACP 1 (MAIN GATE), 2, 3, AND 4 "
M5-26.cal	M5-26 SANITARY SEWER SERVICE DETAILS SHEET 3 OF 3
M1-31.cal	M1-31 TRUCK INSPECTION FACILITY - GATE 9A - FLOOR DRAINS & SERVICE WATER
A1-29.cal	A1-29 TRUCK INSPECTION FACILITY FLOOR PLANS
A5-32.cal	A5-32 TRUCK INSPECTION FACILITY DETAILS SHEET 2 OF 2

END OF AMENDMENT

APPLICATION OF WAGE DECISIONS

Solicitation No: **DACA63-03-B-0004**
Project: **Access Control Building**
Location: **Fort Hood, Texas**
 Bell and Coryell Counties

- 1. Davis-Bacon Act General Decision TX030043, Heavy and Highway Construction Projects,** will be applicable to the construction, alteration, painting or repair of buildings, installation within buildings, appurtenances to buildings, foundations for buildings, excavation and fill for buildings and utilities within five feet of buildings for those construction activities performed in Bell and Coryell Counties.
- 2. Davis-Bacon Act General Decision TX030051, Building Construction Projects,** will be applicable to the construction and all utilities more than five feet from buildings, and any other construction requirements not shown in paragraph 1 above in **Bell** and **Coryell** Counties.

NOTE:

(1) **CERTIFIED PAYROLL RECORDS ARE REQUIRED, UNDER THE DAVIS-BACON AND RELATED ACTS (DBRA), AND MUST BE SUBMITTED WEEKLY, TO THE U.S. ARMY CORPS OF ENGINEERS, FOR ALL CONSTRUCTION PERFORMED.**

(2) **THE WAGE DECISION NUMBER APPLICABLE TO THE WORK PERFORMED FOR EACH CERTIFIED PAYROLL PERIOD, IS TO BE SHOWN (ANNOTATED) ON EACH AND EVERY CERTIFIED PAYROLL RECORD SUBMITTED. MULTIPLE WAGE DECISION USAGE DURING ANY ONE WORK PERIOD SHALL ALSO BE SO ANNOTATED TO THE CERTIFIED PAYROLL RECORD.**

Any questions Prospective Bidders may have with regard to Davis-Bacon Act Wage Decision Applicability must be addressed to the Fort Worth District Contracting Division Labor Relations Team at 1-800-443-7914.

KILLEEN-TEMPLE, TX SMSA AREA

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL
EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (APR 1984) (FAR 52.222-23D)
(DEVIATION)**

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation <u>for each trade</u>	Goals for female participation <u>for each trade</u>
16.4%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs Office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance Programs, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the--

- (1) Name, address, and telephone number of the subcontractor;
- (2) Employer's identification number of the subcontractor;
- (3) Estimated dollar amount of the subcontract;
- (4) Estimated starting and completion dates of the subcontract; and
- (5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is: the Texas Cities of Killeen and Temple, and **Bell and Coryell** Counties.

GENERAL DECISION TX030043 06/13/2003 TX43

Date: June 13, 2003

General Decision Number **TX030043**

Superseded General Decision No. TX020043

State: **TEXAS**

Construction Type:

HEAVY

HIGHWAY

County(ies):

BELL	CORYELL	TRAVIS
BEXAR	GUADALUPE	WILLIAMSON
BRAZOS	HAYS	
COMAL	MCLENNAN	

Heavy (excluding tunnels and dams) and Highway Construction Projects (does not include building structures in rest area projects). *NOT TO BE USED FOR WORK ON SEWAGE OR WATER TREATMENT PLANTS OR LIFT/PUMP STATIONS IN BELL, CORYELL, McLENNAN AND WILLIAMSON COUNTIES.

Modification Number	Publication Date
0	06/13/2003

COUNTY(ies):

BELL	CORYELL	TRAVIS
BEXAR	GUADALUPE	WILLIAMSON
BRAZOS	HAYS	
COMAL	MCLENNAN	

SUTX2042A 03/26/1998

	Rates	Fringes
AIR TOOL OPERATOR	8.08	
ASPHALT HEATER OPERATOR	11.00	
ASPHALT RAKER	8.00	
ASPHALT SHOVELER	7.97	
BATCHING PLANT WEIGHER	11.00	
CARPENTER	10.80	
CONCRETE FINISHER-PAVING	9.57	
CONCRETE FINISHER-STRUCTURES	8.83	
CONCRETE RUBBER	8.52	
ELECTRICIAN	16.25	
FLAGGER	6.86	
FORM BUILDER-STRUCTURES	8.77	
FORM LINER-PAVING & CURB	8.00	
FORM SETTER-PAVING & CURB	8.68	
FORM SETTER-STRUCTURES	8.73	
LABORER-COMMON	7.12	
LABORER-UTILITY	7.99	
MECHANIC	12.15	
OILER	11.40	
SERVICER	8.44	

ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-03-B-0004

PAINTER-STRUCTURES	10.00
PIPE LAYER	8.27
ASPHALT DISTRIBUTOR OPERATOR	9.70
ASPHALT PAVING MACHINE	9.26
BROOM OR SWEEPER OPERATOR	7.12
BULLDOZER	9.28
CONCRETE CURING MACHINE	7.79
CONCRETE FINISHING MACHINE	11.00
CONCRETE PAVING SAW	9.79
SLIPFORM MACHINE OPERATOR	11.15
CRANE, CLAMSHELL, BACKHOE, DERRICK, DRAGLINE, SHOVEL	10.12
FOUNDATION DRILL OPERATOR TRUCK MOUNTED	15.00
FRONT END LOADER	8.86
HOIST - DOUBLE DRUM & LESS	10.81
MIXER	7.12
MIXER - CONCRETE PAVING	11.00
MOTOR GRADER FINE GRADE	12.37
MOTOR GRADER	11.14
PAVEMENT MARKING MACHINE	8.31
PLANER OPERATOR	15.75
ROLLER, STEEL WHEEL PLANT-MIX PAVEMENTS	7.73
ROLLER, STEEL WHEEL OTHER FLATWHEEL OR TAMPING	7.33
ROLLER, PNEUMATIC, SELF PROPELLED	7.17
SCRAPERS	8.38
TRACTOR-CRAWLER TYPE	9.40
TRAVELING MIXER	7.92
TRENCHING MACHINE, HEAVY	9.92
WAGON-DRILL/BORING MACHINE	8.00
REINFORCING STEEL SETTER PAVING	14.50
REINFORCING STEEL SETTER STRUCTURES	10.61
STEEL WORKER-STRUCTURAL	11.73
SPREADER BOX OPERATOR	8.55
WORK ZONE BARRICADE	8.29
SIGN INSTALLER	7.97
TRUCK DRIVER-SINGLE AXLE LIGHT	8.32
TRUCK DRIVER-SINGLE AXLE HEAVY	7.954
TRUCK DRIVER-TANDEM AXLE SEMI- TRAILER	8.02
TRUCK DRIVER-LOWBOY/FLOAT	10.12
WELDER	11.02

Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after
award only as provided in the labor standards contract clauses
(29 CFR 5.5(a)(1)(ii)).

In the listing above, the "SU" designation means that rates
listed under that identifier do not reflect collectively
bargained wage and fringe benefit rates. Other designations
indicate unions whose rates have been determined to be
prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
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The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

GENERAL DECISION TX030051 06/13/2003 TX51

Date: June 13, 2003

General Decision Number TX030051

Superseded General Decision No. TX020051

State: **TEXAS**

Construction Type:
BUILDING

County(ies):
BELL CORYELL

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories).

Modification Number Publication Date
0 06/13/2003

COUNTY(ies):
BELL CORYELL

ELEC0072A 08/29/2002		
	Rates	Fringes
ELECTRICIANS	20.55	4.25+4%
CABLE SPLICERS	21.55	4.25+4%

IRON0482B 06/01/2002		
	Rates	Fringes
IRONWORKERS, Structural	16.65	4.65

SUTX1067A 11/16/1991		
	Rates	Fringes
AIR CONDITIONING AND HEATING		
MECHANICS (Excluding Duct Work)	9.10	
BRICKLAYERS	14.00	
CARPENTERS (Including Drywall		
Hangers)	11.58	
CEMENT MASONS	10.50	
GLAZIERS	7.00	.46
INSULATION INSTALLERS (Batt		
and Blown)	8.31	.54
IRONWORKERS, Reinforcing	11.00	
LABORERS (Including Mason		
Tenders)	5.61	
LATHERS	15.33	
PAINTERS	8.32	.13
PLASTERERS	12.78	
PLUMBERS AND PIPEFITTERS		
(Excluding HVAC Work)	10.07	
POWER EQUIPMENT OPERATORS:		

ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-03-B-0004

Backhoes	8.54	
ROOFERS	7.78	
SHEET METAL WORKERS (Including HVAC Work)	9.79	
SOFT FLOOR LAYERS	13.46	.26
TILE SETTERS	15.00	.25

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

INCIDENTAL PAVING AND UTILITIES

ASPHALT HEATER OPERATOR	7.55	
ASPHALT RAKER	6.50	
CARPENTER	8.75	
CONCRETE FINISHER-PAVING	8.50	
CONCRETE FINISHER-STRUCTURES	8.35	
ELECTRICIAN	14.00	
FORM BUILDER-STRUCTURES	8.90	
FORM LINER-PAVING & CURB	8.05	
FORM SETTER-PAVING & CURB	7.10	
FORM SETTER-STRUCTURES	7.70	
LABORER-COMMON	5.60	
LABORER-UTILITY	6.45	
MECHANIC	10.00	
SERVICER	6.60	
PIPELAYER	5.70	
POWER EQUIPMENT OPERATORS:		
Asphalt Distributor	7.00	
Asphalt Paving Machine	7.15	
Broom or Sweeper Operator	6.60	
Bulldozer, 150 HP & Less	7.10	
Bulldozer over 150 HP	7.35	
Concrete Paving Finishing Machine	7.00	
Crane, Clamshell, Backhoe, Derrick, Dragline, Shovel Less than 1 1/2 C.Y.	8.00	
Crane, Clamshell, Backhoe, Derrick, Dragline, Shovel 1 1/2 C.Y. & Over	9.45	
Foundation Drill Operator, Truck Mounted	10.50	
Front End Loader 2 1/2 C.Y. & Less	7.10	
Front End Loader Over 2 1/2 C.Y.	7.85	
Motor Grader Operator, Fine Grade	9.05	
Motor Grader Operator	8.35	
Roller, Steel Wheel, Plant-Mix Pavement	6.20	
Roller, Steel Wheel Other Flatwheel or Tamping	5.95	
Roller, Pneumatic, Self Propelled	5.90	
Scraper, 17 C.Y. & Less	6.15	
Scraper, Over 17 C.Y.	7.10	
Side Boom	6.30	
Tractor, (Pneumatic) 80 HP & Less	6.00	

Tractor, (Pneumatic) over 80 HP	7.20
TRUCK DRIVERS:	
Single Axle, Light	6.45
Single Axle, Heavy	6.60
Tandem Axle or Semi-trailer	6.55
WELDER	9.50

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

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The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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END OF GENERAL DECISION

SECTION 01000

CONSTRUCTION SCHEDULE

[AM #0002]

PART 1 GENERAL

1.1 SCHEDULE

Commence, prosecute, and complete the work under this contract in accordance with the following schedule and Section 00700 CONTRACT CLAUSES COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK and LIQUIDATED DAMAGES:

	Commencement of Work (calendar days)	Completion of Work (calendar days)	Liquidated Damages per calendar day[¹]
<u>Item of Work</u>	<u>days)</u>	<u>days)</u>	<u>day[¹]</u> <u>—</u>

NOTE: See section 01320A (Rev-1), paragraph 1.2.1.1.2, Defined Required Completion and Liquidated Damages, for Commencement of Work, Completion of Work and Liquidated Damages.

Establishment of Turf

Planting and maintenance for turfing shall be in accordance with Section 02926 ESTABLISHMENT OF TURF. No payment will be made for establishment of turf until all requirements of the section are adequately performed and accepted, as determined by the Contracting Officer.

1.1.1 Testing of Heating and Air-Conditioning Systems

The times stated for completion of this project includes all required testing specified in appropriate specification sections of heating, air conditioning and ventilation systems including HVAC Commissioning. Exception: boiler combustion efficiency test, boiler full load tests, cooling tower performance tests, and refrigeration equipment full load tests, when specified in the applicable specifications, shall be preformed in the appropriate heating/cooling season as determined by the Contracting Officer.

1.2 SEPTIC SYSTEMS

The Contractor is responsible for submitting the plans to the appropriate county for review and acceptance of the septic systems before they are constructed, registered and inspected.

1.3 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (OCT 1989)
(ER 415-1-15)(52.0001-4038 1/96)

a. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the contract clause entitled "Default: (Fixed Price Construction)." In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

b. The following schedule of monthly anticipated adverse weather delays due to precipitation and temperature is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities. Wind is not considered in the Monthly Anticipated Adverse Weather Calendar Day Schedule.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

KILLEEN, TX AREA (FORT HOOD, BELTON AND STILLHOUSE LAKES AND
RESERVE CTRS. ALONG HWY 36 FROM HWY 79 TO HWY US67)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	4	4	4	6	4	3	3	4	4	3	4

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day.

The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph "b", above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Default (Fixed Price Construction)."

1.4 SUPERINTENDENCE OF SUBCONTRACTORS

a. The Contractor shall be required to furnish the following, in addition to the superintendence required by the Contract Clause entitled "SUPERINTENDENCE BY CONTRACTOR":

(1) If more than 50% and less than 70% of the value of the contract work is subcontracted, one superintendent shall be provided at the site and on the Contractor's payroll to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

(2) If 70% or more of the value of the work is subcontracted, the Contractor shall be required to furnish two such superintendents to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

b. If the Contracting Officer, at any time after 50% of the subcontracted work has been completed, finds that satisfactory progress is being made, he may waive all or part of the above requirement for additional superintendence subject to the right of the Contracting Officer to reinstate such requirement if at any time during the progress of the remaining work he finds that satisfactory progress is not being made.

1.5 WORK RESTRICTIONS

1.5.1 Access

All delivery trucks must enter through the 79th Street Entrance.

1.5.2 Working Hours

Normal working hours are Monday through Friday, 0700 to 1630 hours.

1.5.3 Security Requirements

For the duration of this Contract, access to Fort Hood will be delayed between 5 minutes to 30 minutes or more due to increased security precautions, including the checking of vehicle occupants' IDs, vehicle manifests, and the searching of all vehicles. Any general or specific threat to the safety of those working or living at Fort Hood could result in longer waiting times at the access points to Fort Hood.

The following are requirements for contractor employees entering Fort Hood:

- a. One form of picture ID.
- b. A memo from the construction company on their letterhead stating the reason for entry, contract number, and the location at Fort Hood where the jobsite is located.
- c. All delivery trucks must have a bill of lading and delivery truck drivers must have a picture ID.
- d. Employee Identification Badges: Contractor personnel shall wear visible Contractor-furnished employee identification badges while physically on the Installation. Each badge shall include, as a minimum, the company name, employee name, photograph, Contract Title, Contract Number, and the expiration date of the badge. See Section 01500 TEMPORARY CONSTRUCTION FACILITIES for additional requirements.

1.6 UTILITIES

1.6.1 Payment for Utility Services

Water, gas, and electricity are available from Government-owned and operated systems and will be charged to the Contractor at rates as provided in Contract Clause 52.236.14 AVAILABILITY AND USE OF UTILITY SERVICES.

1.6.2 Outages

The Contractor shall coordinate all requests for utility outages with the Contracting Officer in writing 14 days prior to date of requested outage:

- a. Water, gas, steam, and sewer outages shall be held to a

maximum duration of 2 hours unless otherwise approved in writing.

b. Electrical outages shall have a maximum duration of 2 hours.

c. All utility outages shall be scheduled only on Saturdays, Sundays, or holidays unless specific approval is otherwise received.

[AM #0002]1.7 STREET CLOSINGS

The Contractor shall coordinate all requests for street closings with the Contracting Officer in writing 14 days prior to date of requested outage.

(a) Street closings are to not to be incurred during peak-hours of traffic flow and more specifically are defined as Mon-Fri from the hours of 5:00 am to 9:15 am and from the hours of 11:15 am to 1:15 pm.

(b) The contractor is required to maintain traffic flow during peak-hours in all lanes at all gates as they are currently being used at time of solicitation of contract, to include both inbound and outbound lanes, during all phases of construction, to also include restriction of operations of personnel and equipment near the traffic flow.

(c) During street closings the contractor shall maintain one lane traffic at all times.

(d) The contractor shall also return the required lanes for peak-hour traffic flow into operational status after close of each work day.

(e) The final street repair shall be completed within 14 days after any street crossing. Any part of the street returned to service prior to final repair shall be maintained smooth with hot-mix cold-lay surface course.

(f) Open cuts across paved roads will not be allowed. Utility crossings will be accomplished by boring or jacking procedures.

[AM #0002]

1.8 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION (DFAR 252.236-7004)(DEC 1991)

(a) The Government will pay all costs for the mobilization and demobilization of all of the Contractor's plant and equipment at the contract lump sum price for this Item.

(1) 60 percent of the lump sum price upon completion of the Contractor's mobilization at the work site.

(2) The remaining 40 percent upon completion of demobilization.

(b) The Contracting Officer may require the Contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraphs (a)(1) and (2) of this clause do not bear a reasonable relation to the cost of the work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of-

(i) Actual mobilization costs at completion of mobilization;

(ii) Actual demobilization costs at completion of demobilization; and

(iii) The remainder of this item in the final payment under this

contract.

(2) The Contracting Officer's determination of the actual costs in paragraph (b)(1) of this clause is not subject to appeal.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 01320A (Rev-1)

PROJECT SCHEDULE

PART 1 GENERAL

1.1 QUALIFICATIONS

The Contractor shall designate a scheduler who shall be responsible for the preparation of the project schedule and periodic updates. The Scheduler shall have three years of experience in construction scheduling, estimating, cost management, and impact/change order analysis. The Scheduler shall have the responsibility of coordinating and updating the schedule and providing required updates in a timely manner. Qualifications of the scheduler shall be submitted to the Contracting Officer for review with the Preliminary Project Schedule submission.

1.2 SEQUENCING AND PHASING

The maintenance of traffic flow onto the Fort and through the various construction sites shall be given a high priority. As a result, the Contractor shall prepare a construction schedule that will consider the sequence by which the Access Control Points (ACPs) will be constructed and also the phasing of the construction at the various sites in order to maintain the flow of traffic.

1.2.1 Sequencing

As a result of the volume of traffic entering and leaving Fort Hood each day, upwards of 115,000 vehicles per day, and the concentration of major entry gates around the main cantonment area, there are significant sequencing issues relating to the construction of the ACPs. A construction site on or along a roadway will generally require or cause a slowdown and thus a backup in the traffic through the site. If construction sites are located in or near the same vicinity, such as several of the ACPs, it is reasonable to expect a degree of traffic gridlock at significant periods during the day if all are under construction at the same time. In addition, some gates are performing tasks that are to be shifted to other gates after construction of the new gate is completed. Thus, it is important to consider the above factors in setting a construction sequence for the various gates.

Fort Hood has 23 ACPs and a Visitor Control Center (VCC) to be constructed. The ACPs are classified into three categories, which are: Main/Primary, Secondary, and Limited Use/Residential ACPs. These ACPs are located around the Fort Hood boundary but are concentrated into four distinct areas, which consist of the Main Cantonment, West Fort Hood, North Fort Hood, and Residential areas. Four primary ACPs and seven secondary ACPs control access to the main cantonment area. One primary ACP and three secondary ACPs control access to West Fort Hood. North Fort Hood has access controlled through two secondary ACPs. The three residential areas are controlled by six Limited Use/Residential ACPs. The size of the ACP, the location of the ACP, and the function of the ACP are key factors in deciding the construction priorities. The priorities are listed below:

- Priority 1 - VCC, Gates 1, 4, 7, 9, 9-TIF
- Priority 2 - Gates 2, 3, 5, 6, 9A, 9A-TIF
- Priority 3 - Gates 8, 21
- Priority 4 - Gates 10, 11, 12, 13, 14, 15, 22, 26, 27 & Gate-Airport

Fort Hood, Access Control Points

The VCC shall be constructed before ACP 3 (Clear Creek), because visitor passes, which will eventually be issued at the VCC, are currently being issued at ACP 3. Construction of the VCC is, for the most part, outside of the flow of traffic and construction can be started without impacting the construction of Gate 1. Care should be taken to avoid interfering with traffic flow across the Santa Fe Avenue overpass during the construction of Gate 1. Construction activities in the median area of Fort Hood at the VCC shall not be started until the Main Gate ACP is completed.

The VCC and ACPs are to be placed into phases and grouped as follows:

Phase I: VCC, Gate 1, Gate 3 & Gate 6

Phase II: Gate 8, Gate 9, Gate 9-TIF, Gate 9A, Gate 9A-TIF,
Gate 14, Gate 15, Gate 21 & Gate Airport

Phase III: Gate 2, Gate 4, Gate 5 & Gate 7

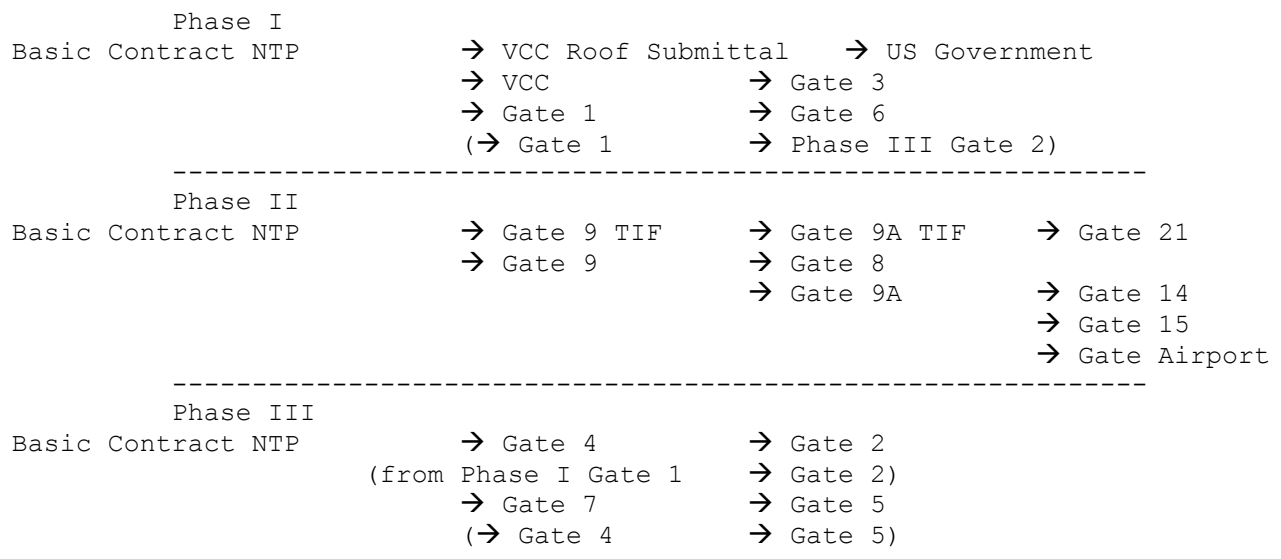
Phase IV: Gate 10, Gate 11, Gate 12, Gate 13, Gate 26,
Gate 26 & Gate 27

1.2.1.1 Logic of Sequence, Required Completion & Liquidated Damages

Commence, prosecute, and complete the work under this contract in accordance with the following schedule and Section 00800 SPECIAL CONTRACT REQUIREMENT clauses COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK and LIQUIDATED DAMAGES:

This project is to be constructed as shown in the following Flow Diagram with the VCC and ACPs grouped into four (I-IV) phases with the described logic of sequence and with the required completion dates after the notice to proceed (NTP) is issued for the basic contract. The contract schedule as described further in this specification section shall also include the phases, logic of sequence and the required completion times as described below.

Flow Diagram:



Fort Hood, Access Control Points

Phase IV		
Basic Contract NTP	→ Gate 10	→ Gate 11
	→ Gate 12	→ Gate 26
	→ Gate 13	→ Gate 27
	→ Gate 22	

1.2.1.1.1 Defined Logic of Sequence

A note that dictates how the work shall proceed further defines each of the following sequences.

Phase I:

NTP → Visitor Control Center's Roof Submittal → Government
Note: The VCC's submittal for its roof shall be transmitted to the Government within 30 Calendar of NTP.

NTP → Visitor Control Center → Gate 3 (Clear Creek Road)
Note: Construction of Gate 3 is not to start until after completion and acceptance of Visitor Control Center.

NTP → Gate 1 (Main Gate/Hood Road) → Gate 6 (Santa Fe)
Note: Construction of Gate 6 is not to start until after completion and acceptance of Gate 1

NTP → Gate 1 → to Phase III Gate 2
Note: Construction of Gate 2 (East Gate Road) shown in Phase III is not to start until after completion and acceptance of Gate 1.

Phase II:

NTP → Gate 9 (Clarke Road - North) → Gate 9A (Clarke Road South)
Note: Construction of Gate 9A is not to start until after completion and acceptance of Gate 9.

NTP → Gate 9 TIF (Truck Inspection) → Gate 9A TIF → Gate 21 (79th St)
Note: Construction of Gate 9A TIF is not to start until after completion and acceptance of Gate 9 TIF. Construction of Gate 21 is not to start until after completion and acceptance of Gate 9A TIF.

NTP → Gate 9 → Gate 8 (Tank Destroyer).
Note: Construction of Gate 8 is not to start until after completion and acceptance of Gate 9.

NTP → Gate 9 → Gate 9A → Gate 14 (Old Copperas Cove Road).
Note: Construction of Gate 14 is not to start until after completion and acceptance of Gate 9A.

NTP → Gate 9 → Gate 9A → Gate 15 (Mohawk Road).
Note: Construction of Gate 15 is not to start until after completion and acceptance of Gate 9A.

NTP → Gate 9 → Gate 9A → Gate Airport (Robert Gray Airfield).
Note: Construction of Gate Airport is not to start until after completion and acceptance of Gate 9A.

Fort Hood, Access Control Points

Phase III:

NTP → Gate 4 (Warrior Way Road) → Gate 2 (East Gate Road)
Note: Construction of Gate 2 is not to start until after completion and acceptance of Gate 7.

NTP → Phase I Gate 1 → Gate 2
Note: Construction of Gate 2 is also not to start until after completion and acceptance of Gate 1 (Main Gate).

NTP → Gate 7 (West Range Road) → Gate 5 (East Range Road)
Note: Construction of Gate 5 is not to start until after completion and acceptance of Gate 7.

NTP → Gate 4 → Gate 5
Note: Construction of Gate 5 is also not to start until after completion and acceptance of Gate 7.

Phase IV:

NTP → Gate 10 (Hoover Hill/Ft. Hd St) → Gate 11 (Hoover Hill/Hwy 190)
Note: Construction of Gate 11 is not to start until after completion and acceptance of Gate 10.

NTP → Gate 12 (Venable Village/Bus 190) → Gate 26 (Venable Village-West)
Note: Construction of Gate 26 is not to start until after completion and acceptance of Gate 12.

NTP → Gate 13 (Johnson Drive/CC Rd) → Gate 27 (Washington/Hwy 190)
Note: Construction of Gate 27 is not to start until after completion and acceptance of Gate 13.

NTP → Gate 22 (10th Street/Warrior Way)
Note: No special notes.

1.2.1.1.2 Defined Required Completion and Liquidated Damages

All work is to be done in sequence as defined in the above paragraphs and to be completed within the duration allocated within the contract schedule. The Visitor Control Center and each of the twenty-three (23) Access Control Points are considered separate items of work within the contract and each have separate contract completion times from the basic contract Notice to Proceed (NTP). Each of these items of work have separate liquidated damages associated with them and will be assessed as determined by the Contracting Officer for failure to deliver the items of work within the time frame allocated as described below:

Item Of Work	Commencement Of Work	Completion of Work in Calendar Days From Basic Contract NTP	Liquidated Damages per Calendar Day
Visitor Control Center	Immediately after Basic Contract NTP	two-hundred-ninety (290 days)	\$5,500.00
Gate 1 (Main Gate)	Immediately after Basic Contract	two-hundred-twenty (220 days)	\$9,625.00

Fort Hood, Access Control Points

Item Of Work	Commencement Of Work	Completion of Work in Calendar Days From Basic Contract NTP	Liquidated Damages per Calendar Day
Gate 2 (East Gate)	To start after completion and acceptance of Gate 1 and Gate 4	three-hundred-sixty (360 days)	\$6,875.00
Gate 3 (Clear Creek)	To start after completion and acceptance of Visitor Control Center	four-hundred-twenty (420 days)	\$5,500.00
Gate 4 (Warrior Way)	Immediately after Basic Contract NTP	two-hundred-thirty (230 days)	\$8,250.00
Gate 5 (East Range Road)	To start after completion and acceptance of Gate 4 and Gate 7	three-hundred-forty (340 days)	\$2,750.00
Gate 6 (Santa Fe)	To start after completion and acceptance of Gate 1	three-hundred-twenty (320 days)	\$4,125.00
Gate 7 (West Range Road)	Immediately after Basic Contract NTP	two-hundred-thirty (230 days)	\$2,750.00
Gate 8 (Tank Destroyer)	To start after completion and acceptance of Gate 9	two-hundred-seventy (270 days)	\$1,375.00
Gate 9 (Clarke Rd - North)	Immediately after Basic Contract NTP	one-hundred-eighty (180 days)	\$2,750.00
Gate 9-TIF (Inspection/North)	Immediately after Basic Contract NTP	one-hundred-eighty (180 days)	\$2,750.00
Gate 9A (Clarke Rd - South)	To start after completion and acceptance of Gate 9	two-hundred-seventy (270 days)	\$4,125.00

Fort Hood, Access Control Points

Item Of Work	Commencement Of Work	Completion of Work in Calendar Days From Basic Contract NTP	Liquidated Damages per Calendar Day
Gate 9A-TIF (Inspection/South)	To start after completion and acceptance of Gate 9-TIF	two-hundred-seventy (270 days)	\$4,125.00
Gate 10 (Hoover Hill/Ft. Hd)	Immediately after Basic Contract NTP	two-hundred (200 days)	\$1,375.00
Gate 11 (Hoover Hill/190)	To start after completion and acceptance of Gate 10	three-hundred (300 days)	\$1,375.00
Gate 12 (Venable/Bus 190)	Immediately after Basic Contract NTP	two-hundred (200 days)	\$1,375.00
Gate 13 (Johnson/CC Road)	Immediately after Basic Contract NTP	two-hundred (200 days)	\$1,375.00
Gate 14 (Old Copperas Cove)	To start after completion and acceptance of Gate 9A	three-hundred-sixty (360 days)	\$1,375.00
Gate 15 (Mohawk Road)	To start after completion and acceptance of Gate 9A	three-hundred-sixty (360 days)	\$2,750.00
Gate 21 (79 th Street)	To start after completion and acceptance of Gate 9-TIF	three-hundred-sixty (360 days)	\$2,750.00
Gate 22 (10 th St/Warrior)	Immediately after Basic Contract NTP	two-hundred) (200 days)	\$1,375.00
Gate 26 (Venable - West)	To start after completion and acceptance of Gate 12	three-hundred (300 days)	\$1,375.00

Fort Hood, Access Control Points

Item Of Work	Commencement Of Work	Completion of Work in Calendar Days From Basic Contract NTP	Liquidated Damages per Calendar Day
Gate 27 (Washington/190)	To start after completion and acceptance of Gate 13	three-hundred (300 days)	\$1,375.00
Gate Airport (Robert Gray)	To start after completion and acceptance of Gate 9A	three-hundred-sixty (360 days)	\$1,375.00

1.2.2 Phasing of Construction of Individual ACPs

The schedule shall be developed to show the phasing of construction at each ACP. Maintenance of traffic flow through each ACP site is important and a plan will be required to manage the flow of traffic through the site during construction. See Fort Hood ACP Specification SECTION 01500 TEMPORARY CONSTRUCTION FACILITIES Paragraph PROTECTION AND MAINTAINENCE OF TRAFFIC.

In order to provide a recommended traffic flow plan for each of the gates, the following sections are provided as a recommendation for phases and sequence of traffic control.

1.2.2.1 Main Access Control Point

ACP 1: Main Gate - Hood Road. The construction phasing can be done in 2 phases as follows:

1. Maintain the existing 3 lanes of inbound traffic flow, while the ACP structure and pavement is constructed within the median area between the inbound and outbound lanes and outside to the east, of the existing traffic lanes.
2. After the above construction is completed, the 3 traffic lanes can be routed through the new ACP lanes and the rest of the ACP lanes can be constructed.

1.2.2.2 Visitor Control Center (Hood Road)

The Visitor Control Center (VCC) is located off Hood Road, such that construction will in general not impact the flow of traffic on Hood Road or Santa Fe Avenue. However, there are three areas of impact with existing roads that must be considered in the phasing of construction for this site.

1. The construction in the median area between the inbound lanes must be delayed until ACP Gate 1 (Hood Road) becomes operational. The current operational plan for Ft. Hood during peak traffic periods is to reverse the traffic flow on 2 of the 3 outbound lanes. Access to these 2 lanes is through the gap in the median at the Visitor's Center.

Fort Hood, Access Control Points

2. The timing for the change of the traffic pattern on Santa Fe Avenue, i.e. change from 2-lane with 1 lane each travel direction to 2-lane of both inbound and the removal of the traffic barrier must be coordinated with Ft, Hood.
3. Access of traffic going to the saddle and Hunt Club must be maintained. Traffic to this area currently comes from both inbound and outbound lanes of Hood Road.

1.2.2.3 Primary Access Control Points

ACP 2: East Gate (Tank Destroyer Blvd. - East). The phasing can be done in 3 phases, which are as follows:

1. Maintain the existing lanes of inbound and outbound traffic, while the new ACP outbound lanes are constructed.
2. After the above construction is completed, the outbound lanes and median can be used for traffic; so that the ACP inbound lanes can be constructed.
3. After the above construction is completed, shift the traffic to ACP inbound lanes, so that the ACP gatehouse and median can be constructed.

ACP 3: Clear Creek Road. The phasing on this ACP can be done in 2 phases as follows:

1. Maintain the existing 3 lanes of inbound traffic, while 3 of the ACP's 4 inbound lanes are constructed.
2. After the above construction is completed, the 3 traffic lanes can be routed through the new ACP lanes and the rest of the ACP gatehouse, median, and additional lanes are constructed.

ACP 4: Warrior Way. The phasing on this ACP can be done in 2 phases as follows:

1. Maintain the existing 3 lanes of inbound traffic, while 3 of the ACP's 4 inbound lanes are constructed.
2. After the above construction is completed, the 3 traffic lanes can be routed through the new ACP lanes and the rest of the ACP gatehouse, median, and additional lanes are constructed.

ACP 9A: Clarke Road (South). The phasing on this ACP can be done in 2 phases as follows:

1. Maintain the existing lanes of inbound and outbound traffic, while construction on the 3-ACP inbound lanes is completed.
2. Reroute the traffic through the new inbound lanes, while finishing the rest of the construction on the ACP.

1.2.2.4 Secondary Access Control Points

ACP 5: East Range Road. The phasing on this ACP can be done in 3 phases.

1. Construct a 2-lane bypass to the west of the current road. Road

Fort Hood, Access Control Points

will need to be designed for current traffic and paved.

2. Start and finish construction of the ACP Structure, median islands, and roadway.
3. Route traffic through the ACP, complete the site development and remove the temporary by-pass road.

ACP 6: Santa Fe Avenue. The phasing on this ACP can be done in 3 phases.

1. The new outbound lane and a temporary lane (where the gatehouse will be located) will be constructed.
2. Route inbound traffic on the current outbound lane and the temporary lane, while two of the new inbound lanes of the ACP are constructed.
3. Route the inbound traffic through the new ACP lanes and complete the ACP gatehouse and median.

ACP 7: West Range Road. The phasing on this ACP can be done in 2 phases. Due to the low traffic volume, one lane can handle the traffic volume.

1. Start and finish construction outside the existing lanes.
2. Route inbound traffic through the new ACP lane and start and finish the ACP structure and median islands.

ACP 8: Tank Destroyer (West). The phasing on this ACP can be done in 3 phases.

1. Start and finish construction on the new paved area (southern part of the new roadway) maintaining traffic on the existing roadway.
2. Start and finish construction on the outbound lane (northern part of the new roadway) with traffic rerouted to the new inbound lane just completed.
3. Start and finish the middle portion of the ACP facility.

ACP 9: Clarke Road (North). The phasing on this ACP can be done in 2 phases as follows:

1. Maintain the existing lanes of inbound and outbound traffic, while work outside of the existing roadway is completed.
2. After the above construction is completed, reroute traffic onto the new roadway facility and start work on the rest of the ACP structure and median island.

ACP 14: Old Copperas Cove Road (West). The construction can be done in a single phase with little to no interruption of traffic due to the low volume of traffic. The only obstruction would be the center island.

ACP 15: Mohawk Road. There is currently no traffic volume in this area and there would not need to be any construction phasing for this ACP. There will need to be some interaction between the Contractor and TXDOT to tie the roadway created by the ACP with the Clear Creek roadway.

Fort Hood, Access Control Points

ACP 21: 79th Street. Since this gate is the current trunk inspection point and that function will be relocated to Gates 9 and 9A, it is assumed that this gate will be closed and therefore construction can be done in a single phase.

ACP 22: 10th Street. The construction can be done in a single phase with little to no interruption of traffic. The only obstruction would be the center island.

Airport Gate. The construction can be done in 3 phases with little to no interruption of traffic.

1. Start and finish construction outside of the existing roadway facility.
2. Shift traffic to the new outbound lane and existing outbound lane. Construct the new ACP inbound lane.
3. Shift inbound traffic into the new inbound ACP lane and construct the ACP and median islands.

1.2.2.5 Housing/Limited Use Access Control Points

ACP's 10 and 11 are in the same residential area and shall be constructed sequentially. ACPS 12 and 16 are in the same residential area and shall be constructed sequentially. ACP's 13 and 27 are in the same residential area and shall be constructed sequentially.

ACP 10: Hoover Hill Road and Fort Hood Street. The construction can be done in a single phase with little to no interruption of traffic.

ACP 11: Hoover Hill Road and Access Road. The construction can be done in a single phase with little to no interruption of traffic.

ACP 12: Venable Drive and Business Route 190. The construction can be done in a single phase with little to no interruption of traffic.

ACP 13: Butler Street and Clear Creek Road. The construction can be done in a two phases.

1. The outbound lane will have to be widened to allow construction of the center island.
2. Construct the center island and complete the ACP structure.

ACP 26: Venable Road and Access Road. The construction can be done in a two phases.

1. The outbound lane will have to be widened to allow construction of the center island.
2. Construct the center island complete the ACP structure.

ACP 27: Washington Street and Access Road. The construction can be done in a single phase with little to no interruption of traffic.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a Project Schedule as described below shall be prepared. The scheduling of construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 BASIS FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule, scheduling personnel, or approved periodic schedule updates will result in an inability of the Contracting Officer to evaluate Contractor's progress for the purposes of payment. In this event, progress payments will not be made until corrective action is taken and the schedule is approved by the Contracting Officer. The contractor's pay estimates shall be based upon the amount of work completed as agreed upon between Government and Contractor personnel during the Periodic Progress Meetings further specified below.

3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer.

3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in the Precedence Diagram Method (PDM)

3.3.2 Level of Detail Required

The Project Schedule shall be at a level of detail appropriate for the size and complexity of the project. Failure to develop or update the Project Schedule or provide data to the Contracting Officer at the appropriate level of detail, as specified by the Contracting Officer, shall result in the disapproval of the schedule. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule:

3.3.2.1 Activity Durations

Contractor submissions shall follow the direction of the Contracting Officer regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods (usually less than 2 percent of the durations all non-procurement activities' are greater than 20 days).

3.3.2.2 Project Activities, General

Project activities consist of all construction activities, including design-related activities, mobilization, demobilization, placement of warranty tags, O&M manuals, jobsite clean-up, and required testing and training. Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. These procurement tasks include, but are not limited to: submittals, approvals, procurement, fabrication, delivery, installation, start-up, testing, and training.

3.3.2.3 Critical Activities

The following activities shall be listed as separate line activities on the Contractor's project schedule:

- a. Submission and approval of mechanical/electrical layout drawings.
- b. Submission and approval of O & M manuals.
- c. Submission and approval of as-built drawings.
- d. Submission and approval of 1354 data and installed equipment lists.
- e. Submission and approval of testing and air balance (TAB)
- f. Submission of TAB specialist design review report.
- g. Submission and approval of testing and balancing of HVAC plus commissioning plans and data.
- h. Air and water balance dates.
- I. HVAC commissioning dates.
- j. Controls testing plan.
- k. Controls testing.
- l. Performance Verification testing.
- m. Other systems testing, if required.
- n. Prefinal inspection.
- o. Correction of punchlist from prefinal inspection.
- p. Final inspection.

3.3.2.4 Government Activities

Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: the review of Government-approved submittals, approvals, inspections, utility tie-in, Government Furnished Equipment (GFE), and Notice to Proceed (NTP) for phasing requirements.

3.3.2.5 Responsibility

All activities shall be identified in the project schedule by the party responsible for performing the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, or government

agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.3.2.6 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.3.2.7 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number. Whenever possible, changes shall be added to the schedule by adding new activities. Existing activities shall not normally be changed to reflect modifications.

3.3.2.8 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

3.3.2.9 Phase of Work

All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not contain work in more than one phase of work. The project phase of each activity shall be identified by the unique Phase of Work Code.

3.3.2.1D Category of Work

All activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited, to the procurement chain of activities including such items as submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.3.2.11 Feature of Work (Work Breakdown Structure(WBS))

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to, a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code or WBS Code.

3.3.2.12 Resources

All appropriate activities shall be assigned resources (labor, materials, equipment) that are expected to be used during the execution of the activity.

3.3.2.13 Costs

All work activities shall be cost-loaded with the amount budgeted. The sum

of all activities in the schedule shall equal the total contract amount.

3.3.2.14 Design and Permit Activities

The Contractor shall integrate design and permitting activities, including necessary conferences, follow-up actions, and design package submission dates, into the schedule. These activities shall be coded to designate design and permitting.

3.3.2.15 Data Dictionary

The Contractor shall submit a coding scheme that shall be used throughout the project for all activity codes contained in the schedule. The coding scheme submitted shall list the values for each activity code category and translate those values into project specific designations. For example, a Responsibility Code Value, "ELE", may be identified as "Electrical Subcontractor." Activity code values shall represent the same information throughout the duration of the contract.

3.3.3 Scheduled Project Completion

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have an AES@ constraint date equal to the date that the NTP was acknowledged, and a zero day duration. It is possible for submittal activities to be started before NTP. If started, such activities will not alter the Contract start date or completion time for the Contract.

3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the currently approved contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.3.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted in the narrative report at every project schedule update period to assist the Contracting Officer in evaluating the Contractor's ability to actually complete prior to the contract period.

3.3.4 Interim Completion Dates

Contractually specified interim phasing completion dates shall be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date. Activities with separate completion dates shall also be constrained to show negative float if the completion date is not met.

3.3.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the completion date for the phase of the project, and a zero day duration.

3.3.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Program features which calculate one of these parameters from the other shall be disabled.

3.3.6 Out-of-Sequence Progress

Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the Contracting Officer. The Contractor shall propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. If approval is not given, a revised schedule that reflects corrections to the original logic to show the current sequence of activities shall be submitted prior to payment being made for those items of work.

3.3.7 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. A data disk and a printed, legible network diagram are required for each submission. Submissions shall contain the same level of detail as is being used by the contractor for project management.

3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned

operations for the first 9D calendar days, shall be submitted for approval within 15 calendar days after the NTP is acknowledged unless otherwise approved by the Contracting officer. Summary activities for the remainder of the project will be included along with budgeted costs for all activities. The sum of the budgeted costs shall equal the contract amount. The preliminary schedule, upon acceptance, shall be used for payment purposes not to exceed 90 calendar days after NTP. After that time period, the approved, updated Initial Schedule shall be used.

The Preliminary Project Schedule shall be submitted within 21 days of NTP defining the Contractor's planned operations, including a detailed 100% design schedule and a summary of the balance of the project. The Government shall have 3D days for review. Upon review and acceptance of the Contracting Officer, this schedule shall be used for analysis and payment purposes until submittal of the Initial Schedule (see paragraph entitled "Initial Project Schedule Submission"). Upon submittal and approval, the updated initial schedule shall be used for payment purposes. The schedule shall include significant activities with milestone dates including:

- Contract Notice to Proceed
- Phases as specified in contract
- Preliminary and Initial Schedule Submittal dates
- Design Submittal Dates
- Government Review Periods
- Review Conference Dates
- Resubmittal of Final Design/Construction Documents
- Government Review of Final Design/Construction documents
- Construction Closeout Activities
 - (e.g., operation and maintenance manuals, record drawings testing of equipment and systems, prefinal inspection procedures, and correction of deficiencies, and final cleanup)
- Commissioning of HVAC Systems
- Substantial Completion

No payment will be made until this schedule is accepted.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 45 calendar days after NTP. The schedule shall provide a logical sequence of activities which represent work activities through the entire project and shall be at an appropriate level of detail as defined in paragraph PROJECT SCHEDULE. The Government has 30 days for approval.

3.4.3 Periodic Schedule Updates

The Contractor shall submit periodic updates as required by the Contracting Officer. Updated data discussed in the periodic progress meetings will be the basis for the schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative, is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Not Used

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the preliminary submission, initial submission, and every periodic project schedule update throughout the life of the project:

3.5.1 Data Disks

Three data disks containing the project schedule shall be provided. The automated scheduling software utilized by the Contractor shall be capable of direct data input into the scheduling system currently in use by the Government. The Government (e.g. the Fort Worth District) currently uses Primavera for Windows, Version 3.1, subject to current update. The Contractor will be responsible for the accuracy of this data and successful data transfer to the Government. In the event of faulty disk(s), the Contractor will be responsible for replacement.

3.5.1.1 File Medium

Required data shall be submitted on CD-ROM disk or 3.5 high-density diskette, formatted under Windows 95, 98, NT, or 2000, unless otherwise approved by the Contracting Officer.

3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the scheduling program used, format of data transfer (P3, PRX, STX, or MPX), file name, the type of schedule (Preliminary, Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the MS-DOS version used to format the disk.

3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

3.5.2 Narrative Report

A Narrative Report shall be provided with the preliminary, initial, and each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken to maintain and/or regain schedule. This report shall be provided for use with the updated schedule in evaluating current progress and as an indicator of upcoming progress. This report shall also accompany pay requests for payment evaluation, or required to be taken. The narrative report is expected to relay to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis.

3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the periodic schedule updates. The

Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The software program used for scheduling shall be capable of producing the reports as listed. The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number and then sorted according to Early Start Date. For completed activities, the Actual Start Date shall be used as the secondary sort.

3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number. Preceding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank line shall be left between each activity grouping.

3.5.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the NTP until the most recent Monthly Progress Meeting.

3.5.5 Network Diagram

The network diagram shall be required on the preliminary and initial schedule submission and on periodic schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. Activity numbers, descriptions, durations, milestones and constraint dates shall be shown, and the critical path shall easily apparent. The network diagram must be legible in its electronic form, or another means of production shall be required subject to Contracting Officer approval. Legibility shall be determined upon submission of the Preliminary Schedule. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number, description, duration, and estimated earned value shall be shown on the diagram.

3.5.5.2 Project Milestone Dates

Fort Hood, Access Control Points

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3 Critical Path

The critical path shall be clearly shown.

3.5.5.4 Banding

Activities shall be coded so that banding is possible to assist in understanding the activity sequence. Typically, this flow will group activities by phase, category of work, work area, and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.5.5.6 Open Ends

Open Ended Activities other than the first and last activities, "Start Project" and "End Project", shall only be used with approval of the Contracting Officer.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss progress or payment shall be at regular intervals mutually agreed to at the pre-construction conference. During these meetings the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. During meetings the Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

3.6.1 Meeting Attendance

The Contractor's Project Manager, Quality Control Manager or staff, and Scheduler shall attend the periodic progress meeting along with similar representation by the Government.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 7 working days after the monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the Contracting Officer. As a minimum, the Contractor shall address the following items on an activity by activity basis during each progress meeting.

3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in progress or completed

3.6.3.2 Duration

The estimated Remaining Duration for each activity in progress. Calculations shall be based on Remaining Duration in applicable work periods for each activity.

3.6.3.3 Earnings

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on lack of satisfactory progress.

3.6.3.4 Logic Changes

All logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule which does not represent the actual or planned prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

Any request for a time extension from the Contractor, whether as a result of added or changed work due to a modification, a differing site condition, or unusually severe weather, shall be accompanied by justification, project schedule data and supporting evidence as the Contracting Officer may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities.
- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the change proposed.
- d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.7.1 Not Used

3.7.2 Not Used

3.7.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

3.8 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 7 calendar days of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, the Contractor shall advise the Contracting Officer within 7 calendar days of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 7 calendar days of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officers proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor. Use of Zero Free Float and Zero Total Float constraints shall not be allowed.

--End of Section --

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SECTION 01421

BASIC STORM WATER POLLUTION PREVENTION PLAN

[AM #0002]

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 110	Protection of Environment: Subchapter D-- WATER PROGRAMS, Discharge of Oil
40 CFR 122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
40 CFR 123	State Program Requirements: The National Pollutant Discharge Elimination System

FEDERAL REGISTER (FR)

63 FR 128	(6 July 1998) Water Pollution; Discharge of Pollutants (NPDES): Storm Water Discharges- Construction Activity; General Permits, 36490-36519
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1.2 SUMMARY

This Section provides a Basic Storm Water Pollution Prevention Plan (SWPPP) that meets the Texas Pollutant Discharge Elimination System (TPDES) General Permit TXR150000. Both the Government and the Contractor meet the definition of operator for the construction activities. The Government has control over the construction plans and specifications. The Contractor has day-to-day control of field activities to ensure compliance with storm water construction permit. The Government or environmental project designer will prepare a Basic SWPPP. The Contractor shall prepare a field and operation specific SWPPP by meeting requirements in the TPDES General Permit TXR150000, this section, and the approved Contractor's SWPPP. Permit office, forms, and regulations can be accessed at the following web site:

//www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdestorm.html (for large or small construction site)

1.3 PROJECT IDENTIFICATION

PROJECT TITLE: Ft. Hood Access Control Points and Visitor Control Center

LOCATION: Ft. Hood, Texas

1.4 PROJECT DESCRIPTION

The scope of this project includes the construction of 21 Access Control Points (ACP) and one Visitor Control Center on Fort Hood. The total project area of new construction for all sites (including construction storage yard) is 88 acres, while the total disturbed area is roughly 55 acres.

1.4.1 ACP 1 - Main Gate, Hood Road

The scope for this site includes construction of one new ACP (building and seven inbound traffic gates), road widening and roadside grading, installation of a new 40-space parking lot, access road, and connecting sidewalk, relocation of underground utilities and electrical distribution lines, extension of an existing box culvert, and installation of three new concrete drainage channels. In addition, this project includes relocation of one former ACP building to the Department of Public Works (DPW) storage yard, demolition of the ACP building concrete slab and several pavement areas, a concrete drainage channel, and removal of numerous trees adjacent to the roadway, all within the area of the new construction. The new construction area extends over 6.5 acres, of which 4.3 acres will be disturbed by direct construction activities.

1.4.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The scope for this site includes construction of one new ACP (building and five inbound traffic gates), road widening and roadside grading, installation of a sidewalk to an existing parking lot, relocation of an existing overhead electrical distribution line, and extension of an existing culvert. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab and several pavement areas within the area of the new construction. The new construction area extends over 5.0 acres, of which 3.4 acres will be disturbed by direct construction activities.

1.4.3 ACP 3 - Clear Creek Road

The scope for this site includes construction of one new ACP (building and four inbound traffic gates), road widening and roadside grading, installation of a new sidewalk to an existing parking lot, relocation of an existing overhead electrical line, installation of a security fence or guardrail, and installation of two culverts. In addition, this project includes relocation of one former ACP building to the DPW storage yard, demolition of the ACP building slab, pavement areas, one parking lot access road, one culvert and one traffic signal, all within the area of the new construction. The new construction area extends over 5.6 acres, of which 4.7 acres will be disturbed by direct construction activities.

1.4.4 ACP 4 - Warrior Way

The scope for this site includes construction of one new ACP (building and six inbound traffic gates), road widening and roadside grading, installation of a 20-space parking lot, installation of a security fence, patrol road, and security lighting, and installation of one culvert. In addition, this project includes relocation of one former ACP building and trailer to the DPW storage yard, demolition of the ACP building slab and limited pavement areas, and removal of various trees adjacent to the road, all within the area of the new construction. The new construction area extends over

8.4 acres, of which 5.7 acres will be disturbed by direct construction activities.

1.4.5 ACP 5 - East Range Road

The scope for this site includes construction of one new ACP (building and two inbound traffic gates), road widening and roadside grading, installation of a 10-space parking lot, relocation of a security fence, and installation of two culverts. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab and several pavement areas within the area of the new construction. The new construction area extends over 3.2 acres, of which 2.3 acres will be disturbed by direct construction activities.

1.4.6 ACP 6 - Santa Fe Avenue

The scope for this site includes construction of one new ACP (building and three inbound traffic gates) and sidewalk, installation of new ramps to Hood Road, road widening and roadside grading, installation of a security guardrail, and installation of two culverts. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab, limited pavement areas, and an access road, within the area of the new construction. The new construction area extends over 7.4 acres, of which 4.4 acres will be disturbed by direct construction activities.

1.4.7 ACP 7 - West Range Road

The scope for this site includes construction of one new ACP (building and two inbound traffic gates), road widening and roadside grading, relocation of a dirt tank trail, installation of a 10-space parking lot, and installation of a security fence. In addition, this project includes demolition of several pavement areas within the area of the new construction. The new construction area extends over 3.0 acres, of which 2.0 acres will be disturbed by direct construction activities.

1.4.8 ACP 8 - Tank Destroyer Blvd. (west)

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), road widening and roadside grading, and installation of a security fence. In addition, this project includes demolition of several pavement areas within the area of the new construction. The new construction area extends over 1.5 acres, of which 1.3 acres will be disturbed by direct construction activities.

1.4.9 ACP 9 - Clarke Road (north)

The scope for this site includes construction of one new ACP (building and two inbound traffic gates), one truck inspection station, road widening and roadside grading, tank trail improvement, installation of a 26-space parking lot and sidewalk/stairs connecting to the ACP building, installation of a security fence, and installation of six culverts. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab and several areas of pavement, all within the area of the new construction. The new construction area extends over 12.8 acres, of which 6.3 acres will be disturbed by direct construction activities.

1.4.10 ACP 9A - Clarke Road (south)

The scope for this site includes construction of one new ACP (building and three inbound traffic gates), one truck inspection station, road widening and roadside grading, installation of a 38-space parking lot, relocation and installation of security fences, and installation of two culverts. In addition, this project includes relocation of several small metal buildings including the former ACP to the DPW storage yard, demolition of the ACP building slab and several pavement areas, and removal of various trees adjacent to the road, all within the area of the new construction. The new construction area extends over 9.7 acres, of which 6.8 acres will be disturbed by direct construction activities.

1.4.11 ACP 10 - Hoover Hill Road and Fort Hood Street

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), and relocation of overhead electrical and communication lines. In addition, this project includes relocation of one former ACP building to the DPW storage yard. The new construction area extends over 0.28 acres, of which 0.19 acres will be disturbed by direct construction activities.

1.4.12 ACP 11 - Hoover Hill Road and Highway 190

The scope for this site includes construction of one new ACP (building and one inbound traffic gate). In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab within the area of the new construction. The new construction area extends over 0.58 acres, of which 0.33 acres will be disturbed by direct construction activities.

1.4.13 ACP 12 - Venable Drive and Business Route 190

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), roadside grading, and extension of an existing culvert. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab within the area of the new construction. The new construction area extends over 0.29 acres, of which 0.13 acres will be disturbed by direct construction activities.

1.4.14 ACP 13 - Johnson Drive and Clear Creek Road

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), and road widening. In addition, this project includes relocation of one former ACP building to the DPW storage yard. The new construction area extends over 1.1 acres, of which 0.31 acres will be disturbed by direct construction activities.

1.4.15 ACP 14 - Old Copperas Cove Road (west)

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), road widening and roadside grading, installation of a 10-space parking lot, and installation of a security fence. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab and several pavement areas within the area of the new construction. The new

construction area extends over 2.8 acres, of which 1.2 acres will be disturbed by direct construction activities.

1.4.16 ACP 15 - Mohawk Road

The scope for this site includes construction of one new ACP (building and two inbound traffic gates), road widening and roadside grading, installation of a 10-space parking lot, installation of a security fence, and installation of one culvert. In addition, this project includes demolition of limited pavement areas and abandonment in place of the road parallel to the new ACP. The new construction area extends over 3.0 acres, of which 1.8 acres will be disturbed by direct construction activities.

1.4.17 ACP 21 - 79th Street

The scope for this site includes construction of one new ACP (building and two inbound traffic gates), road widening and roadside grading, installation of a 10-space parking lot, installation of a security guardrail, and installation of one culvert. In addition, this project includes relocation of two former ACP buildings to the DPW storage yard and demolition of the ACP building slabs, several pavement areas, overhead electrical lines, and a truck inspection facility all within the area of the new construction. The new construction area extends over 2.4 acres, of which 0.95 acres will be disturbed by direct construction activities.

1.4.18 ACP 22 - 10th Street

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), installation of a 10-space parking lot, and installation of a security fence. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of ACP building slab and limited pavement areas, all within the area of the new construction. The new construction area extends over 1.3 acres, of which 0.65 acres will be disturbed by direct construction activities.

1.4.19 ACP 26 - Venable Road and Highway 190

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), and road widening and roadside grading. In addition, this project includes relocation of one former ACP building to the DPW storage yard and demolition of the ACP building slab within the area of the new construction. The new construction area extends over 0.9 acres, of which 0.55 acres will be disturbed by direct construction activities.

1.4.20 ACP 27 - Washington Street and Highway 190

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), and roadside grading. In addition, this project includes relocation of one former ACP building to the DPW storage yard, and demolition of the ACP building slab, and an adjacent road and guardrail, all within the area of the new construction. The new construction area extends over 0.25 acres, of which 0.21 acres will be disturbed by direct construction activities.

1.4.21 Airport Gate ACP

The scope for this site includes construction of one new ACP (building and one inbound traffic gate), road widening and roadside grading, installation of a 10-space parking lot, and installation of a security fence. In addition, this project includes demolition of several pavement areas within the area of new construction. The new construction area extends over 1.7 acres, of which 1.05 acres will be disturbed by direct construction activities.

1.4.22 Visitor Control Center

The scope for this site includes construction of one new Visitor Control Center with two parking areas for 52 and 17 vehicles, and adjacent sidewalks, construction of new access roads, road widening and roadside grading, relocation of existing electrical distribution lines, and installation of two culverts. In addition, this project includes demolition of the Visitor Control Center parking lot, limited pavement areas, and several access roads in the immediate area. The new construction area extends over 9.7 acres, of which 5.2 acres will be disturbed by direct construction activities.

1.5 BID OPTIONS

There are no Bid Options for this project.

1.6 STANDARD INDUSTRIAL CLASSIFICATION (SIC)

1542 - General Contractors - Non-Residential Building, other than Industrial Buildings and Warehouses (i.e. administrative buildings)

1771 - Concrete Work (includes asphalt, i.e. access drives and parking lots, culvert construction)

9711 - National Security (a general category for military facilities)

1.7 LOCATION

1.7.1 ACP 1 - Main Gate, Hood Road

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 1,097 feet south of the intersection of Hood Road and Tank Destroyer Boulevard. The project site is located approximately at 31 degrees 07 minutes 54 seconds latitude, 97 degrees 46 minutes 04 seconds longitude.

1.7.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 622 feet east of the intersection of Tank Destroyer Boulevard and 24th Streets. The new ACP center is located approximately at 31 degrees 07 minutes 56 seconds latitude, 97 degrees 44 minutes 34 seconds longitude.

1.7.3 ACP 3 - Clear Creek Road

The new ACP site is within the boundary of Ft. Hood and is on the Bell/Coryell County line. The project site is located at the intersection of Clear Creek Road and Santa Fe Avenue. The new ACP center is located approximately at 31 degrees 07 minutes 28 seconds latitude, 97 degrees 47 minutes 56 seconds longitude.

1.7.4 ACP 4 - Warrior Way

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located on Warrior Way south of Hood Army Airfield. The new ACP center is located approximately at 31 degrees 07 minutes 49 seconds latitude, 97 degrees 42 minutes 49 seconds longitude.

1.7.5 ACP 5 - East Range Road

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 2,100 feet northeast of the intersection of East Range Road and Murphy Drive. The new ACP center is located approximately at 31 degrees 09 minutes 00 seconds latitude, 97 degrees 43 minutes 09 seconds longitude.

1.7.6 ACP 6 - Santa Fe Avenue

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 30 feet east of the intersection of Santa Fe Avenue and Wratten Drive. The new ACP center is located approximately at 31 degrees 07 minutes 44 seconds latitude, 97 degrees 46 minutes 19 seconds longitude.

1.7.7 ACP 7 - West Range Road

The new ACP site is within the boundary of Ft. Hood and is in Coryell County. The project site is located 1,300 feet northwest of the intersection of West Range Road and Clear Creek Road. The new ACP center is located approximately at 31 degrees 10 minutes 21 seconds latitude, 97 degrees 48 minutes 07 seconds longitude.

1.7.8 ACP 8 - Tank Destroyer Blvd. (west)

The new ACP site is within the boundary of Ft. Hood and is in Coryell County. The project site is located 7,200 feet west of the intersection of Tank Destroyer Boulevard and Clarke Road. The new ACP center is located approximately at 31 degrees 08 minutes 03 seconds latitude, 97 degrees 51 minutes 36 seconds longitude.

1.7.9 ACP 9 - Clarke Road (north)

The new ACP site is within the boundary of Ft. Hood and is in Coryell County. The project site is located 800 feet north of the intersection of Clarke Road and U.S. Highway 190. The new ACP center is located approximately at 31 degrees 07 minutes 26 seconds latitude, 97 degrees 50 minutes 21 seconds longitude.

1.7.10 ACP 9A - Clarke Road (south)

The new ACP site is within the boundary of Ft. Hood and is in Coryell County. The project site is located 100 feet south of the intersection of Clarke Road and U.S. Highway 190. The new ACP center is located approximately at 31 degrees 07 minutes 13 seconds latitude, 97 degrees 50 minutes 21 seconds longitude.

1.7.11 ACP 10 - Hoover Hill Road and Fort Hood Street

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet west of the intersection of Hoover Hill Road and Fort Hood Street (FM 440). The new ACP center is located approximately at 31 degrees 06 minutes 58 seconds latitude, 97 degrees 44 minutes 45 seconds longitude.

1.7.12 ACP 11 - Hoover Hill Road and Highway 190

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet north of the intersection of Hoover Hill Road and U.S. Highway 190. The new ACP center is located approximately at 31 degrees 06 minutes 44 seconds latitude, 97 degrees 45 minutes 11 seconds longitude.

1.7.13 ACP 12 - Venable Drive and Business Route 190

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 80 feet south of the intersection of Venable Drive and U.S. Highway 190. The new ACP center is located approximately at 31 degrees 07 minutes 18 seconds latitude, 97 degrees 45 minutes 29 seconds longitude.

1.7.14 ACP 13 - Johnson Drive and Clear Creek Road

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 350 feet east of the intersection of Johnson Drive and Clear Creek Drive. The new ACP center is located approximately at 31 degrees 07 minutes 04 seconds latitude, 97 degrees 47 minutes 52 seconds longitude.

1.7.15 ACP 14 - Old Copperas Cove Road (west)

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 150 feet northwest of the intersection of Old Copperas Cove Road and Clarke Road. The new ACP center is located approximately at 31 degrees 05 minutes 55 seconds latitude, 97 degrees 50 minutes 38 seconds longitude.

1.7.16 ACP 15 - Mohawk Road

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet west of the intersection of Mohawk Road and Clear Creek Road. The new ACP center is located approximately at 31 degrees 04 minutes 56 seconds latitude, 97 degrees 48 minutes 56 seconds longitude.

1.7.17 ACP 21 - 79th Street

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet south of the intersection of 79th Road and Engineer Drive. The new ACP center is located approximately at 31 degrees 07 minutes 28 seconds latitude, 97 degrees 47 minutes 29 seconds longitude.

1.7.18 ACP 22 - 10th Street

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet southwest of the intersection of 10th Street and Warrior Way. The new ACP center is located approximately at 31 degrees 07 minutes 58 seconds latitude, 97 degrees 43 minutes 46 seconds longitude.

1.7.19 ACP 26 - Venable Road and Highway 190

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet east of the intersection of Venable Drive and the U.S. Highway 190 Access Road. The new ACP center is located approximately at 31 degrees 07 minutes 13 seconds latitude, 97 degrees 45 minutes 52 seconds longitude.

1.7.20 ACP 27 - Washington Street and Highway 190

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located 100 feet south of the intersection of Washington Street and U.S. Highway 190. The new ACP center is located approximately at 31 degrees 07 minutes 16 seconds latitude, 97 degrees 47 minutes 28 seconds longitude.

1.7.21 Airport Gate ACP

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located near the west side of Robert Gray Army Air Field. The new ACP center is located approximately at 31 degrees 04 minutes 24 seconds latitude, 97 degrees 50 minutes 22 seconds longitude.

1.7.22 Visitor Control Center

The new ACP site is within the boundary of Ft. Hood and is in Bell County. The project site is located at the intersection of Hood Road and Railhead Drive. The new ACP center is located approximately at 31 degrees 07 minutes 34 seconds latitude, 97 degrees 46 minutes 10 seconds longitude.

1.8 RECEIVING WATERS

1.8.1 ACP 1 - Main Gate, Hood Road

The storm runoff from the new ACP site flows north to south over the northern portion of the site and south to north over the southern portion of the site into three new concrete storm drain channels, then flows southeast to an unnamed tributary of South Nolan Creek (Fort Hood Municipal Separate Storm Sewer System (MS4), and subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The storm runoff from the new ACP site flows south into an existing drainage ditch by sheet flow, then flows south to an unnamed tributary of South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.3 ACP 3 - Clear Creek Road

The storm runoff from the new ACP site flows east into a new storm drain ditch by sheet flow, then flows south to an unnamed tributary of Clear Creek then to House Creek which flows to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.4 ACP 4 - Warrior Way

The storm runoff from the new ACP site flows to the east and west into two new storm drain ditches by sheet flow, then the runoff flows east and west to two different unnamed tributaries of South Nolan Creek (City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.5 ACP 5 - East Range Road

The storm runoff from the new ACP site flows northeast into two new storm drain ditches by sheet flow, then flows northeast to an unnamed tributary of Airfield Lake, then to Long Branch which is a tributary of South Nolan Creek (City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.6 ACP 6 - Santa Fe Avenue

The storm runoff from the new ACP site flows east into a new storm drain ditch by sheet flow, then flows north to South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Leon River.

1.8.7 ACP 7 - West Range Road

The storm runoff from the new ACP site flows southeast into a new storm drain ditch by sheet flow, then flows north to an unnamed tributary of House Creek which flows to Cow House Creek, ultimately to Belton Lake and Leon River.

1.8.8 ACP 8 - Tank Destroyer Blvd. (west)

The storm runoff from the new ACP site flows west and southwest into a new storm drain and by sheet flow, then flows north to Turkey Run then to House Creek which flows to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.9 ACP 9 - Clarke Road (north)

The storm runoff from the new ACP site flows north into a new storm drain ditch by sheet flow, then flows north to unnamed tributary of Clear Creek then to House Creek which flows to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.10 ACP 9A - Clarke Road (south)

The storm runoff from the new ACP site flows north into a new storm drain ditch by sheet flow, then flows west to an unnamed tributary of Clear Creek then to House Creek which flows to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.11 ACP 10 - Hoover Hill Road and Fort Hood Street

The storm runoff from the new ACP site flows east by sheet flow, then flows east to an unnamed tributary of South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.12 ACP 11 - Hoover Hill Road and Highway 190

The storm runoff from the new ACP site flows northeast by sheet flow, then flows east to an unnamed tributary of South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.13 ACP 12 - Venable Drive and Business Route 190

The storm runoff from the new ACP site flows southeast by sheet flow and a new drainage ditch, then flows south to South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Leon River.

1.8.14 ACP 13 - Johnson Drive and Clear Creek Road

The storm runoff from the new ACP site flows west into an existing ditch by sheet flow, then flows southeast to unnamed tributary of Clear Creek then to House Creek and then to Cow House Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Belton Lake and Leon River.

1.8.15 ACP 14 - Old Copperas Cove Road (west)

The storm runoff from the new ACP site flows southeast by sheet flow into two new drainage ditches, then flows south to an unnamed tributary of Clear Creek then to House Creek which flows to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.16 ACP 15 - Mohawk Road

The storm runoff from the new ACP site flows southeast into two new storm drain ditches, then flows south to an unnamed tributary of Reese Creek, ultimately to Reese Creek and Lampasas River.

1.8.17 ACP 21 - 79th Street

The storm runoff from the new ACP site flows east into an existing storm drain ditch by sheet flow, then flows east to South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Leon River.

1.8.18 ACP 22 - 10th Street

The storm runoff from the new ACP site flows east by sheet flow, then flows east to an unnamed tributary of South Nolan Creek (Fort Hood MS4, and

subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

1.8.19 ACP 26 - Venable Road and Highway 190

The storm runoff from the new ACP site flows east into an existing and a new storm drain ditch, then flows south to South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Leon River.

1.8.20 ACP 27 - Washington Street and Highway 190

The storm runoff from the new ACP site flows north by sheet flow, and into a new storm drain ditch, then flows east to an unnamed tributary of Pershing Lake, then from Pershing Lake to South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to Leon River.

1.8.21 Airport Gate ACP

The storm runoff from the new ACP site flows east into a new drainage ditch, then flows east to unnamed tributary of Clear Creek then to House Creek and from House Creek to Cow House Creek (Fort Hood MS4), ultimately to Belton Lake and Leon River.

1.8.22 Visitor Control Center

The storm runoff from the new ACP site flows north into a new storm drain ditch by sheet flow, then flows north to an unnamed tributary of South Nolan Creek (Fort Hood MS4, and subsequently City of Killeen MS4), ultimately to South Nolan Creek and Leon River.

PART 2 SITE DESCRIPTION

2.1 EXISTING CONDITIONS

2.1.1 ACP 1 - Main Gate, Hood Road

The site is bisected by a 40-foot wide drainage channel. Therefore, the northern portion of the site slopes to the south at an average slope of 3%, while the southern portion of the site slopes to the north at an average slope of 5%. There is currently an existing underground storm drainage facility near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.40. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The site generally slopes from north to south with an average slope of 2.9%. There is currently an existing underground storm drainage facility near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average of 0.49. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.3 ACP 3 - Clear Creek Road

The site generally slopes from north to south with an average slope of 0.7%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.51. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.4 ACP 4 - Warrior Way

The center of the ACP forms a local topographic divide. The west half of the site dips to the northwest at a 1.5% slope. The east half of the site dips to the east at a 1.3% slope. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.45. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.5 ACP 5 - East Range Road

The site generally slopes from southwest to northeast with an average slope of 2.3 percent. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.43. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.6 ACP 6 - Santa Fe Avenue

The site generally slopes from south to north with an average slope of 4.5 percent. There is currently an existing underground storm drainage facility near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.45. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.7 ACP 7 - West Range Road

The center of the ACP forms a local topographic divide. The west half of the site dips to the west at a 1.6% slope. The east half of the site dips to the southeast at a 1.7% slope. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.44. Twenty-year storm frequency and 24-hour duration with 0.31 inches per hour intensity was used for the design of the storm drainage system.

2.1.8 ACP 8 - Tank Destroyer Blvd. (west)

The site generally slopes from southeast to northwest with an average slope of 2.9%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average of 0.43. Twenty-year storm frequency and 24-hour duration with 0.31 inches per hour intensity was used for the design of the storm drainage system.

2.1.9 ACP 9 - Clarke Road (north)

The site generally slopes from south to north with an average slope of 3%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.36. Twenty-year storm frequency and 24-hour duration with 0.31 inches per hour intensity was used for the design of the storm drainage system.

2.1.10 ACP 9A - Clarke Road (south)

The site generally slopes from south to north with an average slope of 2.3%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.43. Twenty-year storm frequency and 24-hour duration with 0.31 inches per hour intensity was used for the design of the storm drainage system.

2.1.11 ACP 10 - Hoover Hill Road and Fort Hood Street

The site generally slopes from southwest to northeast with an average slope of 1.8%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.63. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.12 ACP 11 - Hoover Hill Road and Highway 190

The site generally slopes from south to north with an average slope of 4.6%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.61. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.13 ACP 12 - Venable Drive and Business Route 190

The site generally slopes from northwest to southeast with an average slope of 3.8%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.46. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.14 ACP 13 - Johnson Drive and Clear Creek Road

The site generally slopes from east to west with an average slope of 1%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.46. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.15 ACP 14 - Old Cooperas Cove Road (west)

The site generally slopes from west to east with an average slope of 0.7%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.41. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.16 ACP 15 - Mohawk Road

The site generally slopes from west to southeast with an average slope of 1.5%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.40. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.17 ACP 21 - 79th Street

The site generally slopes from north to south with an average slope of 0.5%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.44. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.18 ACP 22 - 10th Street

The site generally slopes from west to east with an average slope of 2%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.49. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.19 ACP 26 - Venable Road and Highway 190

The site generally slopes from west to east with an average slope of 0.8%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.55. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.20 ACP 27 - Washington Street and Highway 190

The site generally slopes from southwest to northeast with an average slope of 0.9%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.59. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.21 ACP Airport Gate ACP

The site generally slopes from southwest to northeast with an average slope of 0.9%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.53. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.1.22 Visitor Control Center

The site generally slopes from southwest to northeast with an average slope of 3.5%. There are currently no underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.38. Twenty-year storm frequency and 24-hour duration with 0.32 inches per hour intensity was used for the design of the storm drainage system.

2.2 FUTURE CONDITIONS

2.2.1 ACP 1 - Main Gate, Hood Road

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and seven inbound traffic gates), a widened northbound Hood Road, a 40-space parking lot with access road and connecting sidewalk, and three new concrete drainage channels. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.59.

2.2.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

Grades for the site after the construction of the new ACP will change significantly. The grade on the south side of the road will change because of its widening. The site will contain one new ACP (building and five inbound traffic gates), a widened Tank Destroyer Blvd., a new sidewalk to an existing parking lot, and an extended culvert under the roadway. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.61.

2.2.3 ACP 3 - Clear Creek Road

Grades for the site after the construction of the new ACP will change significantly. The grade on the east side of Clear Creek Road will be altered to create a new drainage channel adjacent to the road and flowing to the south. The site will contain one new ACP (building and four inbound traffic gates), a widened Clear Creek Road, a new sidewalk to an existing parking lot, and two new storm water culverts. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted value of 0.57.

2.2.4 ACP 4 - Warrior Way

Grades for the site after the construction of the new ACP will not change significantly, except for drainage swales directly adjacent to the widened road. The site will contain one new ACP (building and six inbound traffic gates), a widened Warrior Way, a 20-space parking lot, a relocated adjacent gravel road, and one new storm water culvert. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.59.

2.2.5 ACP 5 - East Range Road

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and two inbound traffic gates), a widened East Range Road, a 10-space parking lot, and one new storm water culvert. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.52.

2.2.6 ACP 6 - Santa Fe Avenue

Grades for the site after the construction of the new ACP will change significantly. The grades will change as a result of the new access ramps for outbound traffic from Santa Fe Avenue to southbound Hood Road. The site will contain one new ACP (building and three inbound traffic gates), a new ramp to Hood Road, a widened Santa Fe Avenue, and two new storm water culverts. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.47.

2.2.7 ACP 7 - West Range Road

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and two inbound traffic gates), a widened West Range Road, a relocated dirt tank trail, and a 10-space parking lot. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.54.

2.2.8 ACP 8 - Tank Destroyer Blvd. (west)

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gates) and a widened Tank Destroyer Blvd. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.59.

2.2.9 ACP 9 - Clarke Road (north)

Grades for the site after the construction of the new ACP will change significantly. The grades surrounding the ACP and the truck inspection station will be altered to accommodate the new roadways. The site will contain one new ACP (building and two inbound traffic gates), one truck inspection station, a widened Clarke Road, an improved tank trail, a 26-space parking lot and sidewalk/stairs connecting to the ACP building, and five new storm water culverts. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.48.

2.2.10 ACP 9A - Clarke Road (south)

Grades for the site after the construction of the new ACP will change significantly. The grade surrounding the new truck inspection station will be altered to accommodate the new roadways. The site will contain one new ACP (building and three inbound traffic gates), one truck inspection station, a widened Clarke Road, a 38-space parking lot, and two new storm water culverts. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.58.

2.2.11 ACP 10 - Hoover Hill Road and Fort Hood Street

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate). Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.67.

2.2.12 ACP 11 - Hoover Hill Road and Highway 190

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate). Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.66.

2.2.13 ACP 12 - Venable Drive and Business Route 190

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate), and an extended culvert. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.49.

2.2.14 ACP 13 - Johnson Drive and Clear Creek Road

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate). Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.48.

2.2.15 ACP 14 - Old Copperas Cove Road (west)

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate), a widened Old Copperas Cove Road, and a 10-space parking lot. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.47.

2.2.16 ACP 15 - Mohawk Road

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and two inbound traffic gates), a widened Mohawk Road, a 10-space parking lot, and one new storm water culvert. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.63.

2.2.17 ACP 21 - 79th Street

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and two inbound traffic gates), a widened 79th Street, a 10-space parking lot, and one new storm water culvert. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.56.

2.2.18 ACP 22 - 10th Street

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound

traffic gate), and a 10-space parking lot. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.56.

2.2.19 ACP 26 - Venable Road and Highway 190

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate), and a widened Venable Road. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.59.

2.2.20 ACP 27 - Washington Street and Highway 190

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate). Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.61.

2.2.21 Airport Gate ACP

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new ACP (building and one inbound traffic gate), a widened Clarke Road and a 10-space parking lot. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.56.

2.2.22 Visitor Control Center

Grades for the site after the construction of the new ACP will not change significantly. The site will contain one new Visitor Control Center with two parking areas for 52 and 17 vehicles, and adjacent sidewalks, access roads, and two new storm water culverts. Estimated future runoff coefficients vary from 0.3 to 0.95, with a weighted average value of 0.50.

2.3 CONSTRUCTION PHASING

The Contractor shall establish storm water control structures prior to conducting any site disturbing activities. Then subsequent construction activities includes clearing, grubbing, grading, constructing site drainage devices and utilities, foundation, and paving. The Contractor shall maintain temporary and permanent site stabilization at each portion of site in accordance with Section 3.0 EROSION AND SEDIMENT CONTROLS. Storm water control structures shall not be removed until after final stabilization and approval of the COR. Final stabilization is established at the disturbed site when a vegetative cover with a density of 70% of the native undisturbed area exists. It is a Federal and state requirement that the Contractor shall record date of these major construction site activities and dates of stabilization (see paragraph ATTACHMENTS). Construction of this project will start tentatively in July 2003 and will be completed in September 2005.

2.3.1 ACP 1 - Main Gate, Hood Road

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed on the east side of northbound Hood Road in the median, on the west side of southbound Hood Road, and in the area of the box culvert extension.

- B. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off of northbound and southbound Hood Road. Three new concrete drainage channels will be constructed on the roadsides to direct storm flow into the existing drainage channel underneath Hood Road. A concrete box channel will also be extended on this drainage channel.
- C. Construction Phasing - Current lanes of inbound and outbound traffic on northbound Hood Road will be maintained while construction is performed in the median and on the box culvert extension, and road widening is performed on the east side of the site. Then, the new lanes will be used for rerouted traffic while the remainder of the ACP is constructed.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and the slab will be demolished. Several existing underground utilities and overhead electrical distribution lines will be relocated to allow for new construction. Limited areas of pavement and an existing roadside concrete drainage channel will also be removed for new construction.

2.3.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed on both the north and south side of Tank Destroyer Blvd.
- B. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off of Tank Destroyer Blvd. On the south side of the street, sheet flow will finally reach a drainage ditch that heads towards the south. A culvert under the road will be extended as part of the road widening.
- C. Construction Phasing - Current lanes of inbound and outbound traffic on Tank Destroyer Blvd. will be maintained while road widening is performed and new outbound lanes are constructed. Then, the new outbound lanes and the median area will be used for traffic flow while new inbound lane gates are constructed. Finally, all traffic will be diverted to the inbound lanes as the ACP building is completed in the center.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and the building slab will be demolished. An existing overhead electrical distribution line crossing Tank Destroyer Blvd. will be relocated,

and limited areas of pavement will be removed for new ACP construction.

2.3.3 ACP 3 - Clear Creek Road

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow into the drainage ditch along the east side of the site.
- B. Construction Phasing - Inbound and outbound traffic on Clear Creek Road will be maintained within the existing lanes while construction is performed in areas outside of these lanes. Inbound traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining ACP area.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed. The existing ACP building slab will be demolished, along with adjacent storm pipe, an access road to an existing parking lot and limited areas of pavement. An existing overhead electrical line on the east side of Clear Creek Road will be relocated to accommodate the widened roadway at the ACP.

2.3.4 ACP 4 - Warrior Way

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed on the north side of Warrior Way.
- B. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off of Warrior Way. On the south side of the street, flow will enter the existing drainage ditches that run parallel to the road. On the north side of the street, flow will enter newly constructed drainage ditches that run parallel to the road.
- C. Construction Phasing - Inbound and outbound traffic on Warrior Way will be maintained within the existing lanes while construction is performed in areas outside of these lanes. Inbound traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining ACP area.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed, along with an adjacent trailer, and the building slabs will be demolished. Limited pavement areas will also be demolished. Several existing overhead electrical lines crossing Warrior Way will be removed, and an electrical line on the north side of Warrior Way will be relocated to accommodate the widened roadway at the ACP. A security fence on the north side of Warrior Way will also be relocated.

2.3.5 ACP 5 - East Range Road

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into the drainage ditches along both sides of the road.
- B. Construction Phasing - The grade of the existing road will be altered to construct the new ACP, therefore a temporary bypass road will be constructed on the northwest side of the site. Construction on the new ACP will be completed while the new bypass road is in use.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed, as will several existing overhead electrical lines crossing East Range Road. Limited areas of existing pavement will be demolished for new ACP construction, as will the ACP building slab.

2.3.6 ACP 6 - Santa Fe Avenue

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into the drainage ditches along both sides of the road. Two new culverts will be installed underneath connecting roadways, so as to provide overland site drainage towards the north to an existing storm drainage ditch.
- B. Construction Phasing - A temporary lane and one existing outbound lane will be used to route inbound traffic through the outbound area, while inbound lane construction is performed. Once this is completed, the remainder of the ACP lanes will be constructed while maintaining traffic.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and the building concrete slab demolished. A portion of a connecting ramp between Santa Fe Avenue and southbound Hood Road will be removed.

2.3.7 ACP 7 - West Range Road

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into the drainage ditches along the southwest side of the road.
- B. Construction Phasing - One of two inbound traffic lanes on West Range Road will be closed for construction of the widened portion of the ACP. Inbound traffic will then be rerouted through the newly constructed lane while construction is completed in the remaining ACP area.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - Limited areas of existing pavement will be removed for new ACP construction.

2.3.8 ACP 8 - Tank Destroyer Blvd. (west)

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into the drainage ditch along the south side of the road.
- B. Construction Phasing - Construction will begin on areas of the widened roadway outside of the existing traffic lanes. Once this is complete, traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining center area of the ACP.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - Limited areas of existing pavement will be removed for new ACP construction.

2.3.9 ACP 9 - Clarke Road (north)

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed adjacent to all new roadway construction areas to provide positive removal of storm water via sheet flow off the roadway and into drainage ditches along both sides of all roads in the ACP area. New culverts under various roadways will also be installed for storm water flow off of the site.
- B. Construction Phasing - Inbound and outbound traffic on Clarke Road (north) will be maintained within the existing lanes while all necessary construction is performed in areas outside of these lanes. Traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining ACP area.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - An existing ACP building will be removed and the building concrete slab will be demolished. Limited areas of existing pavement will also be demolished.

2.3.10 ACP 9A - Clarke Road (south)

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed on the west side of Clarke Road.
- B. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into drainage ditches along both sides of all roads in the ACP area. Two new culverts under roadways will also be installed for storm water flow off of the site.
- C. Construction Phasing - Inbound and outbound traffic on Clarke Road (south) will be maintained while construction is completed in the inspection area. When this construction is complete, traffic will be rerouted through the inspection area while construction in the main ACP area is completed.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - Three existing ACP buildings will be removed and building slabs will be demolished on site. Extensive areas of existing pavement and concrete will be removed for new ACP construction. An existing overhead electrical pole will be relocated to accommodate new roadway.

2.3.11 ACP 10 - Hoover Hill Road and Fort Hood Street

1. Major Construction Activities

- A. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- B. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed. An electrical line on the north side of Hoover Hill Road will be relocated to accommodate the new ACP building.

3.2.12 ACP 11 - Hoover Hill Road and Highway 190

1. Major Construction Activities

- A. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- B. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and its slab demolished.

2.3.13 ACP 12 - Venable Drive and Business Route 190

1. Major Construction Activities

- A. Grading and Drainage - Minor grading and extension of an existing culvert will be performed around the new ACP building. Storm water will sheet flow off the roadway and into the existing drainage ditch at the roadside edge.
- B. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and its slab demolished.

2.3.14 ACP 13 - Johnson Drive and Clear Creek Road

1. Major Construction Activities

- A. Construction Phasing - Inbound and outbound traffic at the existing ACP will be maintained while construction on widened portions of Johnson Drive are completed. Traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining ACP area.
- B. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed.

2.3.15 ACP 14 - Old Copperas Cove Road (west)

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed on the south side of Old Copperas Cove Road.
- B. Grading and Drainage - Grading will be performed around the new ACP building and in the area of a new parking lot. Storm water will sheet flow off the roadway and parking lot, and into an existing drainage ditch at the intersection with Clarke Road.
- C. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed, along with an adjacent storm culvert. Limited areas of existing pavement and the ACP building slab will also be demolished for new ACP construction.

2.3.16 ACP 15 - Mohawk Road

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into drainage ditches along both sides of the road. Storm water flow on the north side of Mohawk Road will be directed to the south side of the road through a newly constructed culvert.
- B. Construction Phasing - The construction area of the new ACP is immediately adjacent to the existing ACP and roadway, therefore

construction will progress without hindrance to the current traffic flow.

- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2.3.17 ACP 21 - 79th Street

1. Major Construction Activities

- A. Construction Phasing - The entire ACP is expected to be closed during construction of all new facilities.
- B. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP buildings will be removed and slabs will be demolished. Limited areas of existing pavement, electrical lines, and a truck inspection facility will be demolished for new ACP construction.

2.3.18 ACP 22 - 10th Street

1. Major Construction Activities

- A. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- B. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed and limited areas of existing pavement will be removed for new ACP construction. The ACP building slab will be demolished.

2.3.19 ACP 26 - Venable Road and Highway 190

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed around the new ACP building, such that storm water will sheet flow off the roadway, and into the drainage ditch on the south side of Venable Road.
- B. Construction Phasing - Traffic on Venable Road will be maintained while the roadway is widened. Traffic will then be rerouted through the newly constructed lane while construction is completed in the remaining center ACP area.

- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed, and its slab demolished. An existing electrical power pole will be removed.

2.3.20 ACP 27 - Washington Street and Highway 190

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed around the new ACP building. Storm water will sheet flow off the roadway and into an existing drainage ditch at Highway 190.
- B. Construction Phasing - Construction will proceed while keeping both inbound and outbound lanes open to traffic.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing ACP building will be removed, along with an adjacent storm pipe. The ACP building slab will be demolished. North Link Drive will be realigned by others. Existing overhead electrical lines will be removed for new ACP construction.

2.3.21 Airport Gate ACP

1. Major Construction Activities

- A. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off the roadway and into drainage ditches along the south side of the road.
- B. Construction Phasing - Inbound and outbound traffic on Clarke Road will be maintained within the existing lanes while construction is performed in areas outside of these lanes. Inbound traffic will then be rerouted through the newly constructed lanes while construction is completed in the remaining ACP area.
- C. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - Limited areas of existing pavement will be removed for new ACP construction. An existing overhead electrical pole will be relocated to accommodate the new ACP.

2.3.22 Visitor Control Center

1. Major Construction Activities

- A. Clearing and Grubbing - Clearing of vegetation (existing trees) will be performed adjacent to northbound Hood Road.
- B. Grading and Drainage - Grading will be performed to provide positive removal of storm water via sheet flow off new roadways and parking areas and into drainage ditches along the roadside. A new culvert under one roadway will also be installed for directing storm water flow off of the site.
- C. Construction Phasing - The existing visitor center and adjacent roads will be closed during the entire construction period for this site.
- D. Site Stabilization - Permanent site stabilization will be performed by seeding all disturbed areas not covered by asphalt, concrete, buildings, or gravel roads.

2. Major Demolition Activities

- A. Demolition - The existing visitor center parking lot and limited areas of roadway pavement will be demolished for new construction. Several existing overhead electrical lines will be relocated to accommodate new facilities. One connecting ramp of the Santa Fe Avenue/Hood Road interchange will be completely removed.

2.4 SOILS DATA

The source for soils data is they *Soil Survey of Bell County, Texas* or the *Soil Survey of Coryell County, Texas*, both issued by the United States Department of Agriculture, Soil Conservation Service.

2.4.1 ACP 1 - Main Gate, Hood Road

The ACP site is located on the Slidell (SlB) soil, the upper 66 inches of which is classified as a silty clay.

2.4.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The ACP site is located on the Slidell (SlB) soil, the upper 66 inches of which is classified as a silty clay.

2.4.3 ACP 3 - Clear Creek Road

The ACP site is located on the Brackett (BtC2) soil, the upper 6-inches of which is classified as a gravelly loam.

2.4.4 ACP 4 - Warrior Way

The ACP site is located on the Slidell (SlB) soil, the upper 66 inches of which is classified as a silty clay.

2.4.5 ACP 5 - East Range Road

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.6 ACP 6 - Santa Fe Avenue

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.7 ACP 7 - West Range Road

The ACP site is located on the Nuff (NuC) soil, the upper 11 inches of which is classified as a very stoney silty clay loam.

2.4.8 ACP 8 - Tank Destroyer Blvd. (west)

The ACP site is located on the Brackett (BtC2) soil, the upper 6-inches of which is classified as a gravelly loam.

2.4.9 ACP 9 - Clarke Road (north)

The ACP site is located on the Cho (ChB) soil, the upper 11 inches of which is classified as a clay loam.

2.4.10 ACP 9A - Clarke Road (south)

The ACP site is located on the Cho (ChB) soil, the upper 11 inches of which is classified as a clay loam.

2.4.11 ACP 10 - Hoover Hill Road and Fort Hood Street

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.12 ACP 11 - Hoover Hill Road and Highway 190

The ACP site is located on the Brackett (BtC2) soil, the upper 6-inches of which is classified as a gravelly loam.

2.4.13 ACP 12 - Venable Drive and Business Route 190

The ACP site is located on the Slidell (SlB) soil, the upper 66 inches of which is classified as a silty clay.

2.4.14 ACP 13 - Johnson Drive and Clear Creek Road

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.15 ACP 14 - Old Copperas Cove Road (west)

The ACP site is located on the Krum (KrB) soil, the upper 5 inches of which is classified as a silty clay.

2.4.16 ACP 15 - Mohawk Road

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.6.17 ACP 21 - 79th Street

The ACP site is located on the Slidell (SlB) soil, the upper 66 inches of which is classified as a silty clay.

2.4.18 ACP 22 - 10th Street

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.19 ACP 26 - Venable Road and Highway 190

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.20 ACP 27 - Washington Street and Highway 190

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.4.21 Airport Gate ACP

The ACP site is located on the Brackett (BRE) soil, the upper 16 inches of which is classified as a loam.

2.4.22 Visitor Control Center

The ACP site is located on the Denton (DeB) soil, the upper 13 inches of which is classified as a silty clay.

2.5 DRAWINGS

Sheet Reference No. G0-03 LOCATION PLAN

Sheet Reference No. C1-80 STORM WATER CONTROL PLAN - MAIN GATE - HOOD ROAD

Sheet Reference No. C1-81 STORM WATER CONTROL PLAN - ACP GATE 2 - TANK DESTROYER BLVD.

Sheet Reference No. C1-82 STORM WATER CONTROL PLAN - ACP GATE 3 - CLEAR CREEK ROAD

Sheet Reference No. C1-83 STORM WATER CONTROL PLAN - ACP GATE 4 - WARRIOR WAY

Sheet Reference No. C1-84 STORM WATER CONTROL PLAN - ACP GATE 5 - EAST RANGE ROAD

Sheet Reference No. C1-85 STORM WATER CONTROL PLAN - ACP GATE 6 - SANTA FE AVENUE

Sheet Reference No. C1-86 STORM WATER CONTROL PLAN - ACP GATE 7 - WEST RANGE ROAD

Sheet Reference No. C1-87 STORM WATER CONTROL PLAN - ACP GATE 8 - TANK DESTROYER BLVD. (WEST)

Sheet Reference No. C1-88 STORM WATER CONTROL PLAN - ACP GATE 9 - CLARKE ROAD (NORTH)

Sheet Reference No. C1-89 STORM WATER CONTROL PLAN - ACP GATE 9A - CLARKE ROAD (SOUTH)

Sheet Reference No. C1-90 STORM WATER CONTROL PLAN - ACP GATES 10, 11, 12 AND 13 - HOOVER HILLS/FT. HOOD ST., HOOVER HILLS/HWY 190, VENABLE VILLAGE/HWY. B190, JOHNSON DR./CLEAR CREEK ROAD

Sheet Reference No. C1-91 STORM WATER CONTROL PLAN - ACP GATES 14 AND 15, OLD COPPERAS COVE ROAD (WEST) AND MOHAWK ROAD

Sheet Reference No. C1-92 STORM WATER CONTROL PLAN - ACP GATES 21 AND 22, 79TH STREET AND 10TH STREET

Sheet Reference No. C1-93 STORM WATER CONTROL PLAN - ACP GATES 26 AND 27, VENABLE ROAD (WEST) AND WASHINGTON STREET/HWY. 190

Sheet Reference No. C1-94 STORM WATER CONTROL PLAN - ACP AIRPORT GATE - ROBERT GRAY AIRPORT

Sheet Reference No. C1-95 STORM WATER CONTROL PLAN - VISITOR CONTROL CENTER

Sheet Reference No. C5-96 DETAILS - EROSION AND SEDIMENT CONTROL

PART 3 EROSION AND SEDIMENT CONTROLS

3.1 TEMPORARY STABILIZATION

When construction activities cease for periods longer than 14 days, when there are contract delays in turfing operation and a quick cover is required to prevent erosion, or when seasonal conditions preclude immediate permanent stabilization measures, the Contractor shall provide temporary soil stabilization. The disturbed areas eligible for temporary stabilization consists of all unpaved, graded, and disturbed portions of the site when no further field work is scheduled beyond 14 days. However, if the earth disturbing activities will be resumed in 21 days, temporary stabilization measures are not required to be initiated. Temporary stabilization is discussed in Section 01356 STORM WATER POLLUTION PREVENTION MEASURES. Temporary soil stabilization may be accomplished using mulch in accordance with Section 02926 ESTABLISHMENT OF TURF.

3.2 PERMANENT STABILIZATION

Permanent stabilization on disturbed, unpaved, and graded areas shall be initiated no more than 14 days after construction activities have ceased permanently. Final or permanent stabilization shall be in accordance with Specification Sections 02370A SOIL SURFACE EROSION CONTROL and 02926 ESTABLISHMENT OF TURF.

3.3 SEDIMENT BASIN

All ACPs except ACP 4 (Warrior Way), ACP 9 (Clarke Road North), and the Visitor Control Center represent a construction disturbance area of less than 10 acres and thus do not require a temporary sediment basin. At ACP 4 (Warrior Way), the construction area is approximately 9 acres. The runoff from this construction site does not drain to a common collection point; therefore, a temporary sediment basin is not required.

At ACP 9 (Clarke Road North), the construction area is approximately 13 acres. The runoff from this site does not drain to a common collection point; therefore, a temporary sediment basin is not required.

At the Visitor Control Center, the construction area is approximately 10 acres. The runoff from this site is primarily sheet flow and does not drain to a common collection point; therefore, a temporary sediment basin is not required.

3.4 STRUCTURAL CONTROLS

3.4.1 Silt Fence

Silt Fence is used for construction site perimeter control. Silt Fence shall not be used in stream or swale. Sediment at 1/3 height of the fence shall be removed. The Contractor shall verify field conditions, inspect integrity, remove accumulated silt, and maintain silt fence.

3.4.2 Hay Bale Dike

Hay Bale Dike is used for perimeter control and around unpaved perimeter of curb and surface inlet, new manhole, and trenched material from utility construction. Hay Bale Dike may be used in small drainage swales. Hay Bale Dike shall only be used where the effectiveness is required for less than 3 months. Sediment at 1/2 height of the bale barrier shall be removed. The Contractor shall inspect Hay Bale Dike locations and ensure the bales are intact and eliminating sediment from storm runoff.

3.4.3 Contractor Staging, Parking, Material Storage, Borrow and Disposal Areas Protection Device

The Contractor shall establish storm water control structures around the staging, parking, material stockpiled areas, and borrow and disposal areas. A graveled stabilized area or sediment log is acceptable. The Contractor's SWPPP shall show these locations on the vicinity map and/or site drawings and identify the applicable storm water control devices. The Contractor shall inspect and maintain the control structures at these locations.

3.4.4 Rock Filter Berm

Rock Berm is acceptable control structure along stream or steeply sloped or barren swales. The control structure shall have open graded rock of 4 to 8 inches diameter. The graded rock shall be secured with woven sheath of 1-inch diameter opening (maximum) and wire diameter of 20 gauge (minimum). Sediment at 1/3 height of the berm or dam shall be removed.

3.4.5 Earthen Dike

Earthen Dike shall be placed parallel to existing contours for perimeter control by diverting run-on water away from disturbed area. The dike height shall be at least 1 foot greater than the flow depth for the 10-year storm event. Dike side slopes shall be less than 3 to 1 (0.33 percent grade).

PART 4 STORM WATER MANAGEMENT AND CONTROLS

4.1 RUNOFF COMPUTATIONS

The design for the storm drainage system will be based on a 20-year storm frequency and a 24-hour duration. This results in a rainfall intensity of 0.32 inches per hour for all ACP sites, except those located in Coryell County (ACPs 7, 8, 9, and 9A), for which the rainfall intensity is 0.31 inches per hour.

4.2 SITE CONDITIONS

ACP	EXISTING CONDITION			FUTURE CONDITION			DISTURBED ACP AREA (ACRES)	ESTIMATED TOTAL DRAINAGE AREA (ACRES)
	% PAVED	% TURF	AVERAGE C ¹	% PAVED	% TURF	AVERAGE C ¹		
1	15%	85%	0.40	45%	55%	0.59	4.3	6,300
2	29%	71%	0.47	47%	53%	9.61	3.4	6,300
3	33%	67%	0.51	42%	58%	0.57	4.7	33,500
4	23%	77%	0.45	45%	55%	0.59	5.7	6,300
5	20%	80%	0.43	38%	62%	0.52	2.3	6,300
6	23%	77%	0.45	26%	74%	0.47	4.4	6,300
7	21%	79%	0.44	63%	37%	0.54	2.0	33,500
8	20%	80%	0.43	45%	55%	9.59	1.3	33,500
9	9%	91%	0.36	27%	73%	0.48	6.3	33,500
9A	20%	80%	0.43	43%	57%	0.58	6.8	33,500
10	51%	49%	0.63	56%	44%	0.67	0.19	6,300
11	49%	53%	0.61	56%	48%	0.66	0.33	6,300
12	25%	75%	0.46	30%	70%	0.49	0.13	6,300
13	24%	76%	0.46	28%	72%	0.48	0.31	33,500
14	18%	82%	0.41	27%	73%	0.47	1.2	33,500
15	16%	84%	0.40	50%	50%	0.63	1.8	120
21	22%	78%	0.44	40%	60%	0.56	0.85	6,300
22	30%	70%	0.49	40%	60%	0.56	0.65	6,300
26	35%	65%	0.55	45%	55%	0.59	0.55	6,300
27	45%	55%	0.59	48%	52%	0.61	0.21	6,300
Airport	35%	65%	0.53	40%	60%	0.56	1.1	33,500
VCC	12%	88%	0.38	31%	69%	0.50	5.2	6,300
¹ The average runoff coefficient C is a weighted average value, based on percent of paved area (C=0.95) and turf area (C=0.3) in the construction area.								

4.3 PERMANENT EROSION CONTROL STRUCTURES AND STORM WATER TREATMENT UNIT

Permanent drainage structures, which include concrete curbs and gutters, storm drainage system, concrete pavement, asphalt pavement, drainage swales, drainage ditches, turfing, and concrete and pipe culverts, will provide erosion control after completion of construction.

4.4 OUTLET PROTECTION OR OUTFALL VELOCITY DISSIPATION DEVICE

4.4.1 ACP 1 - Main Gate, Hood Road

The proposed storm drains shall be discharged into the existing concrete lined drainage channel that runs underneath Hood Road. Energy dissipation occurs by drain widening at the confluence with the main drainage channel.

4.4.2 ACP 2 - East Gate (Tank Destroyer Blvd. - east)

The storm water flow from the north side of Tank Destroyer Blvd will drain into the existing 36-inch storm drain pipe. Scouring at the pipe exits will be prevented by construction of a concrete headwall.

4.4.3 ACP 3 - Clear Creek Road

The storm water flow from the east side of Clear Creek Road drain will be discharged into an open drainage swale that parallels the road. This water will flow through two 36-inch storm drain pipes. Energy dissipation will occur at the exits by use of flared pipe.

4.4.4 ACP 4 - Warrior Way

The storm water flow from the northwest side of the ACP will drain into an open drainage swale and subsequently through a 24-inch drain pipe. Energy dissipation will occur at the exit by use of flared pipe.

4.4.5 ACP 5 - East Range Road

The storm water flow from the northwest side of the ACP will drain into an open drainage swale and subsequently through a 24-inch drain pipe. Energy dissipation will occur at the exit by use of flared pipe.

4.4.6 ACP 6 - Santa Fe Avenue

The storm water flow from the west access road from Santa Fe Avenue to southbound Hood Road will drain underneath the access road through two 48-inch drain pipes. The storm water flow from the east access road from Santa Fe Avenue to southbound Hood Road will drain underneath the access road through one 24-inch drain pipe. Scouring at the pipe exits will be prevented by construction of a concrete headwall.

4.4.7 ACP 7 - West Range Road

No storm drain pipes are proposed at the West Range Road ACP.

4.4.8 ACP 8 - Tank Destroyer Blvd. (west)

The storm water flow will be discharged into a 24-inch storm drain pipe. Energy dissipation will occur at the exit by use of flared pipe.

4.4.9 ACP 9 - Clarke Road (north)

The storm water flow from the various roadways at this ACP will drain into open swales adjacent to the roadways, and will subsequently flow through various 24-inch storm drain pipes at the site. Flared pipe exits or concrete headwall exits will be used to dissipate energy.

4.4.10 ACP 9A - Clarke Road (south)

The storm water flow from the various roadways at this ACP will drain into open swales adjacent to the roadways, and will subsequently flow through various 24-inch storm drain pipes at the site. Flared pipe exits or concrete headwall exits will be used to dissipate energy.

4.4.11 ACP 10 - Hoover Hill Road and Fort Hood Street

No storm drain pipes are proposed at this ACP.

4.4.12 ACP 11 - Hoover Hill Road and Highway 190

No storm drain pipes are proposed at this ACP.

4.4.13 ACP 12 - Venable Drive and Business Route 190

The proposed storm water flow will be discharged into the existing 24-inch storm drain pipe. Therefore, no additional energy dissipaters are required.

4.4.14 ACP 13 - Johnson Drive and Clear Creek Road

No storm drain pipes are proposed at this ACP.

4.4.15 ACP 14 - Old Copperas Cove Road (west)

No storm drain pipes are proposed at this ACP.

4.4.16 ACP 15 - Mohawk Road

The storm water flow from the north side of Mohawk Road will drain into a newly constructed 24-inch storm drain pipe. Scouring at the pipe exit will be prevented by construction of a concrete headwall.

4.4.17 ACP 21 - 79th Street

The storm water flow from the west side of the ACP will drain into an open drainage swale and subsequently through a 24-inch drain pipe. Energy dissipation will occur at the exit by use of flared pipe.

4.4.18 ACP 22 - 10th Street

No storm drain pipes are proposed at this ACP.

4.4.19 ACP 26 - Venable Road and Highway 190

No storm drain pipes are proposed at this ACP.

4.4.20 ACP 27 - Washington Street and Highway 190

No storm drain pipes are proposed at this ACP.

4.4.21 Airport Gate ACP

No storm drain pipes are proposed at this ACP.

4.4.22 Visitor Control Center

The storm water flow from the Visitor Control Center building and parking areas ACP will drain by sheet flow towards one of two 24-inch storm drain pipes at the site. Flared pipe exits or concrete headwall exits will be used to dissipate energy.

PART 5 BEST MANAGEMENT PRACTICES (BMP)

The Contractor (and the subcontractors) shall be responsible for eliminating pollutants in storm runoff from the project site. The Contractor (and subcontractors) shall be responsible for installing and maintaining BMP to minimize storm water pollution. The Contractor operation specific SWPPP shall, as a minimum, identify BMP on Construction Practices (Dewatering Operations, Paving Operations, Structure Construction and Painting); Material Management (Material Delivery and Storage, Material Use, Spill Prevention and Control), Waste Management (Solid Waste Management, Hazardous Waste Management, Contaminated Soil Management, Concrete Waste, Sanitary/Septic Waste Management), Vehicle and Equipment Management (Vehicle and Equipment Cleaning, Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance), Dust Control for Various Site Conditions (Non-Traffic Disturbed Areas, Disturbed Areas Subject to Traffic, Material Stock Pile Stabilization, Clearing/Excavation, Demolition, Truck Traffic on Unpaved Road, Mud/Dirt Carry-Out), and Contractor Training (Employee and Subcontractor Training).

5.1 CONSTRUCTION PRACTICES

Dewatering Operations: The Contractor (and subcontractor) shall prevent discharge of sediment by methods of sediment control, containment, and disposal. In project areas suspected of potential toxic or petroleum products contamination, the water shall be tested to determine method of disposal.

Paving Operations: The Contractor (and subcontractor) shall avoid discharge of pollutants to storm drains by avoiding paving in wet weather or anticipation of such event, storing material in covered containers, covering and berming storage areas, establish control structures, cover on-site storm grates, and worker and subcontractor training.

Structure Construction and Painting: The Contractor (and subcontractor) shall prevent pollutants in storm runoff by covering, or berming material storage areas, keeping job site clean and orderly, using safer alternate products, stabilizing adjacent disturbed areas, storing material in secondary containment, protecting on-site storm drain, establish control structures, and training of workers and subcontractor.

Solid Waste Materials: Trash and uncontaminated construction debris shall be placed in appropriate covered waste containers. Waste containers shall

be emptied regularly; they shall not be allowed to overflow. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Routine janitorial service shall be provided for all construction buildings and surrounding grounds. No construction waste materials, including concrete, shall be buried or otherwise disposed of on-site. The Contractor shall brief all on site personnel on good housing keeping and waste minimization.

5.2 MATERIAL MANAGEMENT

Material Delivery and Storage Practice: The Contractor (and subcontractor) shall prevent or reduce discharge of pollutants to storm water by minimizing and on-site storage of hazardous and toxic (HT) materials, storing HT in clearly labeled, corrosion-resistant containers with secondary containment at designated and COR-approved area, conducting frequent inspection, keeping current inventory of construction materials on site, training of workers and subcontractor. The storage of reactive, ignitable or flammable liquids shall comply with applicable fire codes of the project area. The Contractor shall contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements.

Material Use and Inventory: The Contractor (and subcontractor) shall use less hazardous, alternate or environmental friendly material, if possible. The Contractor shall have (1) a list of construction material used on site, (2) the material associated potential pollutants, and (3) method of storage and containment in the Contractor operation specific SWPPP. The Material Safety Data Sheet for each construction material on-site shall be in the Contractor's field and operation activity specific SWPPP and will be available on request by regulator agency visitors, safety officers, or COR. The following materials are commonly on-site, pesticides and herbicides, fertilizers, detergents, concrete material, petroleum-based products, fertilizers, tar, asphalt, steel reinforcing bars, other hazardous chemicals such as acid, lime, solvents, curing compounds, sealants, paints, glues, fertilizers, steel reinforcing bars, etc.

Spill Prevention and Control: The Contractor (and subcontractor) shall store HT material in covered containers and inside a fenced area, place readily accessible spill clean-up materials, have protocol for stop work immediately, notification, clean-up, labelling, storage and packaging, transportation, disposal, record- keeping, closure activities, and provide training to workers and subcontractor for response to spills.

5.3 WASTE MANAGEMENT

Solid Waste: Solid waste materials (i.e. excess fresh concrete, grout, mortar or uncontaminated debris) shall be placed in covered containers, and recycled, if possible. Trees and shrubs from site clearing shall be used as mulching material, if possible. Packaging materials such as wood, plastic, and paper shall be recycled to the maximum extent possible and not be disposed of in a landfill. The Contractor shall designate waste containers for segregating waste (domestic, metal, aluminum or plastic). Dry paint cans shall be recycled. The Contractor shall designate waste disposal area, have routine janitorial service for all structures and surrounding grounds, and have routine schedule to service waste containers. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Personnel on the job site shall be briefed on minimizing disposal to landfill by waste segregation and recycling.

Hazardous and Toxic Waste: All excess on-site material such as paints, solvents, petroleum products (fuel, oil, and grease), herbicides, pesticides, acids for cleaning masonry, concrete curing compounds, sealants, paint strippers, wastes from oil-based paint, and glues could become HT waste. Containers of excess material shall be labeled and managed according to the labels and as recommended by the product manufacturers. If no instruction is provided, the Contractor shall turn in contained waste to the installation DRMO, the local household hazardous waste drop-off, or recycling program.

Buildings to be demolished under this Contract shall require removal of the following regulated materials: mercury fluorescent lights, PCB or TCB/DEPH ballasts, items containing ozone depleting chemicals, mercury bulb thermostats, items containing lead-based paint or pipe joints, items containing CFC. Lead hazard control activities shall be performed in accordance with Section 13281 LEAD HAZARD CONTROL ACTIVITIES. Other regulated materials shall be removed and managed in accordance with Section 13284 REMOVAL, RECYCLING, AND DISPOSAL OF REGULATED MATERIAL.

Contaminated Soil: If suspicious of soil contamination during soil moving activities, the Contractor (and subcontractor) shall stop work, notify COR, and establish containment to prevent soil transport or runoff from that location. For removal of contaminated soil, a WORK PLAN shall be prepared for COR approval prior to handling and management of the material. The WORK PLAN shall at least include the following: containment, sampling & analyses, notification to regulatory agencies, transportation, worker safety, training & environmental monitoring, disposal, and documentation and record-keeping.

Construction and Concrete Waste: Construction waste or surplus materials, demolition building debris, scrap metal, rubber, plastic, glass, concrete, and masonry products shall be segregated and recycled to minimize landfill disposal. No construction waste shall be buried or disposed of on-site. Concrete waste shall be controlled and minimized by appropriate storage methods for dry and wet materials, and controlling amount of concrete and cement mixed on site. Sweepings from exposed aggregate concrete shall be collected and returned to aggregate stockpile and they shall not be washed into streets or storm drains. Washout of concrete truck shall be at a designated location that is (1) at least 15 meters (50 feet)(50 feet) from storm drains, open ditches, or water bodies, and (2) surrounded by a containment berm with a temporary pit or sediment trap for containment and settling of washout. Settled solids and set concrete from the pit or trap shall be removed and disposed of properly. Sediment shall be removed and disposed of in accordance with local regulations, and water from the pit or trap shall be pumped to a sanitary sewer with written approval from the COR.

Sanitary/Septic Waste: On-site sanitary facilities shall be established at a convenient location. Facility location, design, maintenance, and waste collection practices shall be approved by COR and are in accordance with local regulations. The Contractor (and subcontractor) shall have a routine schedule for waste pump out by a licensed hauler. Septic waste treatment system shall have a pre-construction permit from the local health regulating agency and have contract service with a licensed company. Temporary sanitary facilities discharging to sanitary sewer system shall be approved by the operator of the system and properly connected to avoid illicit discharges. Wastewater from water-based paint shall not be discharged as sanitary waste.

Building Exterior Cleaning or High-pressure Wash: Storm drains shall be protected by approved storm water control device. Wash onto dirt area, spade in, settle solids in pit, collect (mop up) and discharge to sanitary sewer (with approval from sewer operator). If the exterior paint contains lead exceeding the levels stated in the Consumer Safety Standard, mercury or mildewcide, the wash water shall be collected and disposed of as HT waste.

Street/Pavement Cleaning: Water used for this activity shall be minimized and sediment basin shall be used to contain wastewater. At completion of construction, the silt shall be removed and disposed of in accordance with applicable regulations, and water from the basin shall be pumped to a sanitary sewer with written approval from the COR.

5.4 VEHICLE AND EQUIPMENT MANAGEMENT

Off-site Vehicle Tracking and Dust Control: The Contractor is required to keep vehicles from tracking soils from the project, borrow, and disposal sites. Temporary parking area(s) to be used 30 calendar days or more for the Contractor's equipment or personal vehicles shall be [paved with temporary asphalt] [a stabilized gravel area] with storm water control device. The temporary parking areas shall be removed by the Contractor upon project completion and restored to the satisfaction of the COR. Sprinkling, chemical treatment, light bituminous treatment, or similar methods shall be used for dust control; see Sections 01355 ENVIRONMENTAL PROTECTION. Materials to be transported by truck or other equipment that promote fugitive particle emissions shall be covered and/or sprayed. Use of sprinkling shall be controlled to prevent runoff.

Vehicle and Equipment Cleaning: Washing shall be performed off site at a commercial washing facility that has an oil/water separator as pre-treatment prior to sanitary sewer connection. If washing must occur on site, the wash area shall have written approval from the COR. The on-site wash area shall be bermed from contact with storm drainage system, and detergent shall be bio-degradable. Wastewater shall drain into a lined sediment basin constructed by the Contractor. After project completion, the Contractor shall clean the basin, test and dispose of sediment, in accordance with applicable regulations and to the satisfaction of the COR. Steam cleaning is prohibited on site because it generates significant pollutant concentrations.

Vehicle and Equipment Fueling: Fueling shall be off-site. If fueling must occur on-site, a written approval shall be obtained from COR. If fueling is allowed by the COR, it shall be at a designated area, at least 15 meters (50 feet) away from drainage courses. Fueling operations shall avoid topping of fuel tank, avoid mobile fueling of mobile construction equipment. Fueling locations shall use secondary containment such as drip pan or drop cloth to catch spill or leak, have a stockpile of cleanup material, and absorbent material for immediate clean-up of small spills. A permit shall be obtained from state or local regulatory agency for all on-site fuel storage tanks. In case of spill, avoid hosing down or burial of spilled fuel. The fuel containers shall meet the industrial standard, labeled and stored in accordance with applicable Federal, state, and local codes.

Vehicle and Equipment Maintenance: Outdoor vehicle or equipment maintenance is a significant potential source of storm water pollution. Activities include engine repair, changing fluids, etc. shall be prohibited on job site.

Vehicle and Equipment Parking: All vehicle or equipment parked on-site shall have drip pan or drip cloth to catch spill or leak. Vehicle or equipment (the Contractor and the subcontractor) shall regularly inspect for leaks and schedule routine maintenance to reduce the potential for leaks.

5.5 EMPLOYEE AND SUBCONTRACTOR TRAINING

The Contractor is responsible to provide training for all workers (including the subcontractor) on the job site. The objectives in training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMPs), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. A certificate shall be signed by all trained personnel.

5.6 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The complete edited section is the Basic SWPPP and the Contractor shall revise it to a field and operation specific SWPPP. The SWPPP shall be retained at the job site at all times and readily available to inspector in case of site inspection conducted by the regulating agency. The Construction Site Notice shall indicate the location of SWPPP. The SWPPP shall be completed before filing for NOI. It shall be implemented prior to start of soil disturbing activities. It shall be updated, as necessary, to reflect changing site conditions, BMP practices, new operations or areas of responsibility. The SWPPP REVISION RECORD shall be an attachment to the SWPPP.

5.7 SPILL CONTROL AND REPORTING

In case of spill of hazardous, toxic, and radiological waste (HTRW), the Contractor shall stop work, contain spill, notify the COR and Safety Office, and execute spill control per the SPILL CONTROL PLAN as required in specification SECTION 01355 ENVIRONMENTAL PROTECTION. Spill containment, notification, clean-up, restoration, reporting, record-keeping, etc. shall be in accordance with applicable Federal, state, and local regulations, including III Corps and Fort Hood Regulation 420-2, *Facilities Engineering, Environment and Natural Resources* and III Corps and Fort Hood Regulation 200-10, *Facilities Engineering Spill prevention Control and Countermeasures (SPCCP)* and to the satisfaction of the COR.

PART 6 TIMING OF CONTROLS AND ACTIVITIES.

The Contractor shall (1) sequence soil disturbing activities to preserve existing vegetation, (2) minimize area of disturbance, (3) establish storm water control devices, (4) do not disturb an area until it is necessary to proceed with fieldwork, (5) stabilize disturbed areas as soon as practicable, (6) delay construction of infiltration measures until the end of project when upstream drainage areas are stabilized and established, (7) maintain storm water control devices until stabilized disturbed areas have achieved final stabilization. Final stabilization denotes soil disturbing activities at the site have been completed and a uniform (e.g. evenly distributed, without large bare areas) perennial vegetative cover with a density of 70 percent of all native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as use of rip rap, gabions, or geotextiles) have been employed.

The Contractor's field and operation specific SWPPP shall (1) sequence major construction activities, (2) discuss erosion and sediment control measures, and (3) sequence temporary or permanent stabilization.

- Install silt fences and hay bale dikes, sediment log around perimeter & down slope of construction site.
- Construct stabilized construction entrances.
- Install controls around contractor staging, stockpiled storage, parking, borrow, and disposal area.
- Clearing and Grubbing
- Install inlet protections at all existing storm grates (i.e. curb inlets surface inlets, manholes, etc.)
- Install controls (i.e. rock filter berm, earthen dike) at outfall locations and natural drainage ways down stream from the construction site.
- Regulated Material Abatement from structures to be demolished
- Demolition of structures
- Grading
- Implement Temporary Stabilization on graded areas that have no scheduled fieldwork beyond 14 days
- Construct permanent storm water management structures
- Trenching and excavation for utilities, trenching and excavation
- Cover all excavated or other soil stockpiles with soil retention blankets at the end of each work day and at the threat of precipitation.
- Install inlet protections at all new storm grates (i.e. curb inlets surface inlets, manholes, etc.)
- Backfill the utility trenches in a timely manner to minimize erosion.
- Flatwork.
- Implement permanent stabilization.
- Routinely inspect and maintain erosion and sediment structural control structures; evaluate BMP & revise SWPPP for change conditions or field activities; assess and certify non-storm water discharges; maintain field records and training logs.
- Remove all controls when the project area has achieved final stabilized condition and all construction is completed and accepted by the Contracting Officer.

PART 7 COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

Army Regulation 200-1 requires that all Department of Defense installations and Contractors are required to comply with Federal environmental protection statutes, which includes a provision to observe State, and local environmental regulations.

In compliance with the Clean Water Act, Section 402, a construction site of 1 acre to 5.0 acres in size, or larger, is required to obtain a TPDES Permit to discharge storm water during construction.

Section 404 of the Clean Water Act regulates discharge of dredge and fill material with jurisdictional Waters of the United States. The Corps of Engineers, Fort Worth District will determine if there is Section 404 implications for the project site.

Section 401 of the Clean Water Act regulates the on-site sewerage discharge. If on-site sewerage system is in the project, a pre-construction permit shall be obtained from the state, or regional Environmental Quality Office, or County Health Department.

In compliance with the National Environmental Policy Act of 1969, as amended, the Record of Environmental Decision (REC) dated 16 April 2003 has been prepared for this proposed action. The Fort Hood Master Planning/Real Property Office has prepared this Record of Environmental Consideration and finds that this construction activity will not impact any threatened or endangered species habitat, or significant archeological resources. The construction activity will not affect agricultural lands, wetlands, coastal zones, wilderness areas, aquifers, floodplain, wild and scenic rivers, or areas of critical environmental concern. Some of the ACP facilities will have an on-site sewerage treatment system and the Contractor shall obtain a pre-construction permit from the Bell County or Coryell County Health Department (as applicable) prior to start work.

ACP NUMBER	ACP LOCATION	ON-SITE SEWAGE TREATMENT DISCHARGE
5	East Range Road	Absorption Trench
7	West Range Road	Drain Field
8	Tank Destroyer Blvd. (west)	Drain Field
9	Clarke Road (north)	Drain Field
14	Old Copperas Cover Road (west)	Drain Field
15	Mohawk Road	Evaporative Transpiration

The Contractor shall not start fieldwork until the Section 404 permit issue is resolved and a 404 permit is issued. The permit in compliance with Clean Water Act, Section 404 is issued with mitigation considerations to be implemented by the Contractor. In compliance with Clean Water Act, Section 402, the Contractor and the subcontractor shall conform with all applicable TPDES General Permit TXR150000 requirements. In addition, the Contractor (including the subcontractor) shall comply with applicable requirements and implement the Storm Water Pollution Prevention Plan and BMP measures prior to commencing soil disturbing activities.

PART 8 MAINTENANCE AND INSPECTION PROCEDURES

The Contractor shall designate a Storm Water Inspector on-site to perform SWPPP quality control. All BMP and control structures shall be inspected at least once every seven (7) days and within twenty-four (24) hours following any storm producing 0.5 inch or more of rainfall. The Contractor Designated SWPPP Inspector shall have a basic knowledge of the engineering principles in reducing pollutants in storm water, past experience and thoroughly understand the requirements of the Storm Water Discharge Construction Permit, BMP, Government contractual, and SWPPP requirements, worker training, storm control device inspection and maintenance, SWPPP revision, documentation and record-keeping.

Inspection of erosion and soil loss from the outfall and perimeter of the site. Temporary erosion control measures shall be inspected for bare spots and washouts. Discharge points shall be inspected for signs of erosion or sediment. Locations where vehicles enter and leave the site shall be checked for signs of off-site sediment tracking, including erosion control structure at contractor staging, material borrow, disposal, and stockpiled areas. The Contractor shall continually review the Best Management Practices (BMP) and effectiveness of SWPPP program. All deficiencies shall be corrected and recorded in the INSPECTION AND MAINTENANCE REPORT and a current copy shall be provided to the COR. Corrections to these problems

shall be implemented within seven (7) calendar days. After final stabilization has been achieved, the Contractor shall inspect the site once a month until final inspection and project acceptance by the COR.

PART 9 LIST OF ON-SITE MATERIALS AND OTHER POLLUTANT SOURCES

The Contractor brought onto the job site the following construction material: [____], and the following waste [____] is anticipated. The BMPs to reduce pollutants in storm runoff were described in Part 5.

PART 10 PROHIBITION ON NON-STORM WATER DISCHARGES

In accordance with the Federal Register, Volume 63, No.128, July 6, 1998 Notices, non-storm water discharge is prohibited during construction of the project, except for a list of specific allowable non-storm water discharges. The following list of non-storm water discharges from active construction site is allowed and is developed based on the above guideline.

- fire fighting activities,
- fire hydrant flushings,
- vehicle wash waters which do not contain detergent or leaked fluids
- dust control runoff to minimize off-site tracking by vehicles,
- potable water sources including waterline flushings,
- routine external building wash down which does not use detergents and the exterior paint that does not contain mercury, lead, cadmium, and mildewcides,
- pavement wash waters where spills or leaks do not contain hazardous, toxic, radiological material or detergent,
- air conditioning condensate,
- uncontaminated spring or ground water,
- foundation and footing drains which do not contain contaminated process materials such as solvents

The Contractor designated SWPPP Inspector shall perform routine inspection and record findings in the NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION.

PART 11 CONTRACTOR COMPLIANCE

The Contractor shall use this basic SWPPP to prepare a detailed SWPPP that includes both narrative and drawings (Storm Water Control Plans). The detailed SWPPP shall state the following as a minimum: (1) the project start and completion dates, (2) bid options to be executed with the project, (3) sequence of construction activities and pollution control measures, (4) discussion of the Best Management Practices (BMP) and implementation during project execution, (5) identify the list of materials brought on site, (6) runoff computation of each drainage area (see paragraph 4.1), and (7) revised storm water control plans to include all locations that require structural controls (i.e. site entrance and exit, staging, stockpiled, borrow, and disposal areas) and the type of storm control structures.

11.1 SWPPP AND NOTICE OF INTENT (NOI)

The Contractor shall use this section to prepare a field and operation activity specific SWPPP that includes both narrative and drawings (preferable size 11" by 17") and also in electronic format compatible with the contract requirements. The Contractor SWPPP (both narrative and revised

drawings) shall be submitted for review and approval. The Contractor's SWPPP shall, as a minimum, include the following: (1) each area of construction, describe each physical location & LATITUDE and LOGITUDE of each area; (2) the project start and completion dates; (3) sequence of construction activities and pollution control measures; (4) Best Management Practices (BMP); (5) list of on-site construction materials, methods of storage, & pollution control measures; (6) each construction area runoff coefficient; (7) revised SWPPP drawings depicting storm control devices (i.e. perimeter, down grade, inlet & outfall controls, site stabilized entrance/exit, Contractor staging & parking, stockpiled, borrow, and disposal areas), limit of clearing and grubbing, haul route, surface water flow direction arrows, site direction arrow, and legend; (9) name and qualification of a Designated SWPPP Inspector to inspect, maintain/repair erosion control structures, record findings and subsequent actions, evaluate BMP and revise SWPPP, assess non-storm discharges; (10) record start/stop dates for temporary/permanent ceasing of major construction activities (clearing & grubbing; grading, trenching & excavation; dirt moving, etc.); start dates of temporary and permanent stabilization; repair dates for control structures; release dates of reportable quantities (RQ) for oil and hazardous substances per 40 CFR Parts 110, 117 and 302; repair date of control device; (11) Contractor on-site training to workers; (12) SWPPP revision date for changed site conditions, operation, and BMP; (13) prepare a NOI for the Contractor (who is responsible for day-to-day operation) and submit it at least 2 days prior to commencing work; (14) prepare a separate NOI for the Government's signatory because the Government is an operator who has control over construction plans and specifications [AM #0002]. The mailing addresses for NOI submittal are:

TEXAS

Mailing Address:

Texas Commission On Environmental Quality (TCEQ)
Storm Water & General Permits Team; MC-228
P.O. Box 13087
Austin, TX 78711-3087
(Use for regular and certified mail)

NOI Payment Address (by regular U.S. Mail):

Texas Commission on Environmental Quality (TCEQ)
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, TX 78711-3088

NOI Payment Physical Address:

Texas Commission on Environmental Quality (TCEQ)
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, TX 78753
(Use for overnight express carrier deliveries (U.S. Post Office Express Mail, fed ex, UPS, etc.))

The Contractor shall provide SWPPP (including the revised Storm Water Control Plans) and all necessary attachment for approval.

The TPDES permit form is posted on a web site at
<http://www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdestorm>.

11.1.1 On-Site Construction Document And Record-Keeping

A copy of each of the following shall be maintained at the project site at all times: Contractor revised SWPPP and all attachments, TPDES General Permit TXR150000, Project Site Notice, and Certification of Storm Water Pollution Prevention Plan.

The Contractor shall post a Site Notice near the main entrance of each construction access point. The Site Notice shall have the following information: a copy of NOI that has an authorization number issued by TCEQ (for each co-permittee, the Government and the Contractor), a brief project description, name and telephone number of an operator's representative (for each Contractor & the Government), and the location of SWPPP.

All records pertaining to TPDES General Permit TXR150000 shall be maintained for a minimum of three (3) years from the date that a NOT is submitted.

11.1.2 TPDES General Permit TXR150000 Fees And Fines For Non-Compliance

The Contractor is responsible for all fees pertaining to the storm water construction permit for both the Contractor and the Government (including applicable annual water quality or monitoring fees, if applicable). Any fines levied by regulatory agencies regarding non-compliance with TPDES regulations or the requirements of this Section shall be paid by the Contractor.

11.2 NOTICE OF TERMINATION (NOT)

No later than 30 working days after completion of final stabilization and approval by the COR, the Contractor shall prepare copies of the Notice of Termination (NOT) separately, for the Contractor and the Government. The contractor shall provide the filled out Government NOT to the COR for a signature from an authorized person, and then submit it to Texas Commission on Environmental Quality (TCEQ). A copy of the Government NOT and the Contractor NOT shall be provided to the COR.

11.3 NOTIFICATION TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

A copy of each NOI & NOT (for large construction site), a copy of NOC (Notice of Change is required when relevant information of the initial NOI needs changes), a copy of Construction Site Notice (applicable for small construction site) shall be sent to MS4. For some projects, there is a possibility of more than one MS4. The Contractor shall notify all MS4 within the project site.

The Fort Hood MS4, person of contact (POC), mailing address, and phone for this project is

III Corps & Fort Hood
Attn: AFZF-PW-ENV (Riki Young)
Fort Hood TX 76544-5028
Telephone: 254-387-8712

The City of Killeen POC, mailing address, and phone for this project is

City of Killeen Public Works Administration
John Nett
200 East Avenue D
Killeen TX 76541
Telephone: 254-501-7621

PART 12 ATTACHMENTS

The Contractor shall provide the following attachments in the Contractor field and operation activity specific SWPPP. The list of attachments shall include CONSTRUCTION SITE NOTICE, CONTRACTOR NOTICE OF INTENT (NOI), GOVERNMENT NOTICE OF INTENT (NOI), CONTRACTOR NOTICE OF TERMINATION (NOT), GOVERNMENT NOTICE OF TERMINATION (NOT), CONTRACTOR STORM WATER CONTROL INSPECTION AND MAINTENANCE REPORT, TRAINED CONTRACTOR PERSONNEL LOG, OPERATOR (CONTRACTOR/ SUBCONTRACTOR) CERTIFICATION OF COMPLIANCE FOR TPDES, RECORD OF SWPPP REVISION, RECORD OF MAJOR CONSTRUCTION ACTIVITIES (Grading, Temporary/ Permanent Ceasing/Resuming Construction, stabilization) CONTRACTOR DESIGNATED SITE SWPPP INSPECTOR, OR CONTRACTOR CERTIFICATION FOR SWPPP, SCHEDULE OF SITE RESPONSIBLE PARTIES FOR POLLUTION PREVENTION MEASURES, NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION, AUTHORIZED SIGNATORY.

The Basic SWPPP shall include attachment of TPDES General Permit TXR150000, the Government NOI.

**Fort Hood
Storm Water Pollution Prevention Plan
Inspection and Maintenance Form**

To be completed every 7 days and within 24 hrs of a rainfall event of 0.5 in. or more.

Inspector: _____ Date: _____

Inspector's Qualifications: _____

Days since last rainfall: _____ Amount in in.: _____

Stabilization Measures

Segment	Date Since Last Disturbance	Date of Next Disturbance	Stabilized (Yes/No)	Stabilized With	Condition
ACP 1					
ACP 2					
ACP 3					
ACP 4					
ACP 5					
ACP 6					
ACP 7					
ACP 8					
ACP 9					
ACP 9A					
ACP 10					
ACP 11					
ACP 12					
ACP 13					
ACP 14					
ACP 15					
ACP 21					
ACP 22					
ACP 26					
ACP 27					
Airport					
VCC					

Stabilization Required:

To be performed by: _____ On or before: _____

**Fort Hood
Storm Water Pollution Prevention Plan
Inspection and Maintenance Form
Stabilized Construction Entrance**

Does Sediment get Tracked on the Road?	Is the Gravel Clean or is it Filled With Sediment?	Does all Traffic use the Stabilized Entrance to Leave the Site?	Is the Culvert Beneath the Entrance Working?

Maintenance Required:

To be performed by: _____

On or before: _____

Fort Hood
Storm Water Pollution Prevention Plan
Inspection and Maintenance Form
Perimeter Structural Control

Inspector: _____ Date: _____

Inspector's Qualifications: _____

Days since last rainfall: _____ Amount in in.: _____

Structural Controls: Silt Fence and Hay Bales

Segment	Has Silt Reached 1/3 of Fence Height?	Is Fence Properly Secured?	Is There Evidence of Washout or Overtopping?	Condition of the Fence Fabric	Condition of Hay Bales
ACP 1					
ACP 2					
ACP 3					
ACP 4					
ACP 5					
ACP 6					
ACP 7					
ACP 8					
ACP 9					
ACP 9A					
ACP 10					
ACP 11					
ACP 12					
ACP 13					
ACP 14					
ACP 15					
ACP 21					
ACP 22					
ACP 26					
ACP 27					
Airport					
VCC					

Maintenance required for silt fence and straw bales:

To be performed by: _____ On or before: _____

**Fort Hood
Storm Water Pollution Prevention Plan
Inspection and Maintenance Form
Perimeter Structural Control**

Inspector: _____ Date: _____

Inspector's Qualifications: _____

Days since last rainfall: _____ Amount in in.: _____

Structural Controls: Rock Filter Berm

Segment	Has Silt Reached 1/2 of Berm Height?	Is Wire Mesh Properly Secured?	Is There Evidence of Washout or Overtopping?
ACP 1			
ACP 2			
ACP 3			
ACP 4			
ACP 6			
ACP 9			
ACP 9A			
ACP 15			
ACP 21			
VCC			

Maintenance required for rock filter berms:

To be performed by: _____ On or before: _____

**Fort Hood
Storm Water Pollution Prevention Plan
Inspection and Maintenance Form**

Changes required to the SWP3:

Reasons for changes:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who submitted this information, it is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____

Date: _____

End of Section

SECTION 01451

CONTRACTOR QUALITY CONTROL
[AM #0002]

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction design and construction design and construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 60 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Laboratory facilities approved by the Contracting Officer shall be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff shall maintain a presence at the site at all times

during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be promptly furnished to the CQC organization by the Contractor. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of one years construction experience on construction similar to this contract or a construction person with a minimum of five years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

3.4.3.1 CQC Staff

A staff shall be maintained under the direction of the CQC system manager to perform all QC activities. The staff must be of sufficient size to ensure adequate QC coverage of all work phases, work shifts and work crews involved with the construction. Except as required for specialized CQC personnel, these personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities.

3.4.3.2 Specialized CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, civil, **[AM #0002] submittals, concrete, pavement and soils.** These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

Area & Qualifications

a. Civil

Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience

b. Electrical

Graduate Electrical Engineer with 2 yrs related experience or person with 5 yrs related experience

[AM #0002]

c. Submittals

Submittals Clerk with 1 yr experience

[AM #0002]

d. Concrete, Pavements and Soils

Materials Technician with 2 yrs experience in the type of work being performed on the project

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors". This class is mandatory for the Contractor's quality control manager. Certificates issued upon successful completion are valid for five years. This course is periodically offered at the Fort Worth District, Corps of Engineers Office, Federal Building, Room 1A03, 819 Taylor Street, Fort Worth, Texas. Attendees must be fluent in the English language (able to read and write) at the high school level.

Registration is required; call 817-886-1949 or 817-886-1841 for times and reservations. There is no charge for the course; however the Contractor will pay for travel and per diem costs.

3.4.5 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERIES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 15950A HEATING, VENTILATING AND AIR CONDITIONING (HVAC) CONTROL SYSTEMS; 15951A DIRECT DIGITAL CONTROL FOR HVAC; 15990A TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS; or 15995A COMMISSIONING OF HVAC SYSTEMS are included in the Contract, the submittals required by those sections shall be coordinated with Section 01330 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required..

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved. **(Only coded A or B shop drawing submittals will be considered "as approved." Submittals other than those coded A or B required to be resubmitted will delay the preparatory phase meeting until they have been resubmitted and approved.)**
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government shall be notified at least 72 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes

prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of \$2,000 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing of Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Government-contract laboratory designated by the Area Office.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the Special Contract Requirement Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager and the CQC staff shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the

Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- g. Off-site surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

a. Minimum construction quality control report and the required preparatory and initial inspection documentation.

b. All tests of piping systems or portions thereof shall be recorded on the "Piping System Test Report".

c. When operation and maintenance instructions for equipment are furnished to Government representatives by the Contractor, the Contractor's representative shall record on a form similar to that attached hereto the applicable data, including the name, organization, and signature of each person attending the instructions.

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

SAMPLE FORMS

Sample QC forms follow this page.

(Sample of typical Contractor Quality Control Report)

CONTRACTOR'S NAME
(Address)

DAILY CONSTRUCTION QUALITY CONTROL REPORT

Date: _____ Report No. _____

Contract

No.: _____

Description and Location of work:

WEATHER: (Clear) (P. Cloudy) (Cloudy);
Temperature: _____ Min. _____ Max;
Rainfall _____ inches.

Contractor/Subcontractors and Area of Responsibility with Labor Count for Each

a. _____

b. _____

c. _____

d. _____

Equipment Data: (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used.)

1. Work Performed Today: (Indicate location and description of work performed. Refer to work performed by prime and/or subcontractors by letter in Table above. If no work is performed, report the reason.)

2. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken.)

a. Preparatory Inspection:

b. Initial Inspection:

c. Follow-up Inspections:

3. Test Required by Plans and/or Specifications performed and Results of Tests:

4. Verbal Instructions Received: (List any instructions given by Government personnel on construction deficiencies, retesting required, etc., with action to be taken.)

5. Remarks: (Cover any conflicts in plans, specifications, or instructions or any delay to the job.)

6. Results of Safety Inspection: (Include safety violations and corrective actions taken.)

Contractor's Inspector

CONTRACTOR'S VERIFICATION: The above report is complete and correct and all material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.

Contractor's Chief of Quality Control

NOTE:

DO NOT LEAVE REPORT ITEMS BLANK

Items 1. through 6. must be reported every day. If there is no other report on an item, enter the work "none" in the reporting space. Reports with items left blank will be returned as incomplete.

Page 2

PREPARATORY PHASE CHECKLIST

Contract No. _____ Date: _____

Definable Feature: _____ Spec Section: _____

Gov't Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

	Name	Position	Company/Government
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____

(List additional personnel on reverse side)

II. Submittals

1. Review submittals and/or submittal log 4288.
Have all submittals been approved? Yes _____ No _____

If no, what items have not been submitted?

a. _____

b. _____

c. _____

2. Are all materials on hand? Yes_____ No_____

If no, what items are missing?

a. _____

b. _____

c. _____

3. Check approved submittals against delivered materials. (This should be done as material arrives.)

Comments _____

III. Material storage

Are materials stored properly? Yes_____ No _____

If No, what action is taken? _____

IV. Specifications

1. Review each paragraph of specifications.

2. Discuss procedure for accomplishing the work.

3. Clarify any differences.

V. Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file.

If not, what action is taken? _____

PPC Page 2

VI. Testing

1. Identify test to be performed, frequency, and by whom.

2. When required?

3. Where required?

4. Reviewing Testing Plan.

5. Have test facilities been approved?

VII. Safety

1. Review applicable portion of EM 385-1-1.

2. Activity Hazard Analysis approved? Yes _____ No _____

VIII. Corps of Engineers comments during meeting.

CQC REP

PPC Page 3

INITIAL PHASE CHECKLIST

Contract No. _____ Date: _____

Definable Feature: _____

Gov't Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

	Name	Position	Company/Government
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____

(List additional personnel on reverse side)

IC Page 1

II.

Identify full compliance with procedures identified at preparatory.
Coordinate plans, specifications, and submittals.

Comments

III. Preliminary Work. Ensure preliminary work is complete and correct.
If not, what action is taken?

IV. Establish Level of Workmanship.

1. Where is work located? _____

2. Is a sample panel required? Yes _____ No _____

3. Will the initial work be considered as a sample?

Yes _____ No _____

(If yes, maintain in present condition as long as possible.)

V. Resolve any differences.

Comments

IC Page 2

VI. Check Safety

Review job conditions using EM 385-1-1 and job hazard analysis.

Comments _____

CQC REP

IC Page 3

PIPING SYSTEM TEST REPORT

STRUCTURE OR BUILDING_____

CONTRACT NO. _____

DESCRIPTION OF SYSTEM OR PART OF SYSTEM TESTED: _____

DESCRIPTION OF TEST: _____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME _____

TITLE _____

SIGNATURE _____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED SYSTEM HAS BEEN TESTED AS
INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN
THE CONTRACT SPECIFICATIONS.

SIGNATURE OF INSPECTOR _____

DATE _____

REMARKS: _____

Piping Systems Test Page 1

CONTRACT NO. _____

LOCATION _____

Operation and maintenance instructions were conducted for _____
(Type of Equipment)

on _____.
(Date)

[illegible]

The personnel identified herein by their signatures certify that they have been instructed in the operation and maintenance of the above-mentioned equipment.

-- End of Section --

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

[AM #0002]

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Traffic Management Plan; G

A traffic control plan shall be provided for each phase addressing measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades (use Jersey Barriers between construction areas and adjacent traffic lanes), placement and maintenance of various pavement markings, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction.

Statement of Experience; G

The professional engineer shall submit a statement of experience demonstrating a minimum of 10 years of experience in the design of traffic management control in construction zones.

1.2 GENERAL REQUIREMENTS

1.2.1 Site Plan

[AM #0002]Fenced space has been allocated by DPW to the contractor on Motor Pool Road. The fenced area is approximately 100' x 200'. The contractor is responsible for security, utility hook-ups, maintenance of privacy screening, and clearing of site upon project completion.

1.2.2 Identification of Employees

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.2.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.3 SANITATION

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.4 TELEPHONE

The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic.

1.5.1 Traffic Flow

Traffic flow shall be maintained at all gates during the construction period, except for the ACP gates in residential/limited use areas. For the residential areas, the gates for the given residential area shall be constructed sequentially for a given residential area. The only exception to the above shall be when the Contracting Officer authorizes the closure of the gate.

The Contractor shall prepare a traffic management plan for each ACP gate or the VCC to be submitted to the Contracting Officer for approval a minimum of 14 day prior to the start of construction for an individual gate or VCC.

The traffic management plan shall be prepared by a professional engineer licensed in the State of Texas. The engineer shall have a minimum of 10 years experience, for which a statement of experience shall be submitted for approval. The plan shall be stamped and signed by the Professional Engineer.

The traffic management plan shall address each of the following issues as appropriate to an individual gate.

- a. The plan shall be developed in accordance with applicable safety standards. The plan shall be prepared in accordance with OSHA's Manual of Uniform Traffic Control Devices (MUTCD) Part VI "Standards and Guides for Traffic Controls for Street and highway Construction, Maintenance, Utility, and Incident Management Operations" (http://www.osha.gov/doc/highway_workzones/mutcd/index.html) and the Texas Manual of Uniform Traffic Control Devices.
- b. Because of the need to maintain traffic flow during construction, it is anticipated that the Contractor may have to phase the construction of individual gates. The traffic management plan

shall address the phasing of the construction. Refer to the "Traffic Phasing Plan For Ft. Hood Access Control Points And Visitor Control Center" for phasing of the traffic flow. (For traffic phasing see Fort Hood ACP Specification Section 01320A PROJECT SCHEDULE Paragraph Phasing.) The plan shall include drawings that illustrate each phase of construction. The actual gate sequence is defined in the Construction Schedule.

- c. The plan for each phase shall address measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades (use Jersey Barriers between construction areas and adjacent traffic lanes), placement and maintenance of various pavement markings, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property.
- d. Any bypass or detour roads around construction shall be detailed on the plans. Use the section profile for secondary roads for any bypass or detour roads.
- e. Barricades, pavement markings, lighting, signs, and any other traffic control measures shall be maintained during construction.
- f. The Contractor shall remove all barricades, signs, pavement markings, and lighting used for traffic management at the completion of construction.

1.5.2 Contractor Travel

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.5.3 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.5.4 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or

sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.6 CONTRACTOR'S TEMPORARY FACILITIES

1.6.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.6.2 Storage Area

The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored brown, so that visibility through the fence is obstructed.

Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

1.6.3 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

1.6.4 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on the military property.

1.6.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass

located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.6.6 Not Used

1.6.7 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.7 NOT USED

1.8 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

1.9 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing around the construction site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.10 TEMPORARY HAZARD SAFETY FENCING

The Contractor shall furnish and erect safety fencing at temporary hazards and work site areas considered to be hazardous to the public. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the hazard and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.11 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.12 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

1.13 MOWING

Grass and weedy vegetation within the areas utilized by the Contractor, including work areas, administrative areas, and storage areas, shall be kept mowed to control vegetative growth.

1.13.1 Mowing

Vegetation shall be mowed when it reaches a height of 3 inches. Mowing shall be to a height of 2 inches. Mowing shall be accomplished with a rotary mower that leaves the clippings evenly distributed on the soil surface. Mowing shall be accomplished during periods and in such manner that the soil and grass will not be damaged. Towed or self-propelled riding mowers shall not be operated within 3 feet of trees or shrubs. Areas adjacent to trees and shrubs shall be mowed with hand-propelled mowers.

1.13.2 Areas Not Mowed

Government may immediately after notice to the Contractor and at the discretion of the Contracting Officer mow the Contractor's areas at any time the vegetation height exceeds 3 inches.

1.13.3 Payment

No separate payment will be made for mowing as required under this section and all costs incurred by the Government for performing such work shall be deducted from the contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 01520

GOVERNMENT FIELD OFFICE
[AM #0002]

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Government Field Office; G.

Provide manufacturer catalog data, and specifications, verifying all dimensions, fixtures and equipment.

PART 2 PRODUCTS

2.1 GOVERNMENT FIELD OFFICE

The Contractor shall provide the Government Resident Engineer with a trailer-type mobile office, approximately 10 ft x 24 ft in size or 240 square feet in floor area, located where directed and providing heating and air conditioning, electric light and power, and toilet facilities consisting of one lavatory and one water closet. A mail slot in the door or a lockable mail box mounted on the surface of the door shall be provided. This mobile office shall be a one room office-conference combination with enclosed bath facilities and shall be [AM #0002] provided potable water, sanitary sewer service, and electricity by the contractor and shall be located within the contractor's yard. The office shall be supplied with desk w/ 3 drawers and center drawer, height adjustable chair, lockable supply closet, 2 sony cd-mem stick and carrying case, microwave, refrigerator, marker board, plans table, conference table and chairs, Dell M60 Workstation w/ pent 4 1.7 ghz processor 40gb hd floppy drive cd drive 512mb ddr sdram 64mb usb rms 56k mod mo xp professional and carrying case, plans rack, microwave, hp office jet 7110, one local telephone line with toll free access, telephone with answer machine, cordless and with speaker. The contractor shall re-supply all equipment cartridges on demand at no additional cost to the government. The trailer and all office equipment will be returned to the contractor at project completion.

2.1.1 Manufacturer

Manufacturer shall be regularly engaged in the construction and on-site erection of relocatable modular buildings or trailers.

2.1.2 Utilities

Utilities shall be self-contained as describe above. The Government will

provide the telephone equipment and service to the Government Field Office.

PART 3 EXECUTION

3.1 GENERAL

Securely anchor trailer(s) to the ground at all four corners to guard against movement during high winds. This mobile office shall be ready for use within 30 days after Contract Notice to Proceed.

3.2 JANITORIAL SERVICES

Provide daily janitorial services, trash collection, and building maintenance during the life of the contract.

3.3 MAINTENANCE AND REPAIR

The Contractor shall be responsible for maintenance and repair of the office during the life of the contract.

3.4 [AM #0002] DELETED

3.5 OWNERSHIP AND DISPOSITION

The office, including all furniture and equipment, shall remain the property of the Contractor at completion of the construction. The Contractor shall remove the unit and all associated equipment and utilities after the Government vacates the office.

-- End of Section --

SECTION 02510A

WATER DISTRIBUTION SYSTEM

05/02

Amendment No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 88	(1999e1) Seamless Copper Water Tube
ASTM C 76	(1999) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(2000) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2466	(2001) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2657	(1997) Heat Fusion Joining Polyethylene Pipe and Fittings
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3139	(1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1992) Hypochlorites
AWWA B301	(1999) Liquid Chlorine
AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110	(1993) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA C111	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1996) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153	(1994; Errata Nov 1996) Ductile-Iron Compact Fittings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. through 64 In. (1,400 mm through 1,600 mm) for Water Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1997) Grooved and Shouldered Joints
AWWA C651	(1992) Disinfecting Water Mains
AWWA C800	(1989) Underground Service Line Valves and Fittings
AWWA C900	(1997; C900a) Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution
AWWA C901	(1996) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service
AWWA M23	(1980) Manual: PVC Pipe - Design and Installation

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)

ACPPA Work Practices	(1988) Recommended Work Practices for A/C Pipe
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DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-Restraint Design	(1997) Thrust Restraint Design for Ductile
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Iron Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
INDUSTRY (MSS)

MSS SP-80 (1997) Bronze Gate, Globe, Angle and Check
Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24 (1995) Installation of Private Fire
Service Mains and Their Appurtenances

NFPA 49 (1994) Hazardous Chemicals Data

NFPA 325-1 (1994) Fire Hazard Properties of Flammable
Liquids, Gases, and Volatile Solids

NFPA 704 (1996) Identification of the Fire Hazards
of Materials for Emergency Response

NSF INTERNATIONAL (NSF)

NSF 14 (1998) Plastics Piping Components and
Related Materials

NSF 61 (1999;2001 Addendum 1 - Sep 2001) Drinking
Water System Components - Health Effects

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 21 (1991) White or Colored Silicone Alkyd
Paint

SSPC Paint 25 (1997; R 2000) Zinc Oxide, Alkyd, Linseed
Oil Primer for Use Over Hand Cleaned
Steel, Type I and Type II

1.2 PIPING

This section covers water service lines, and connections to building service at a point approximately 5 feet outside buildings and structures to which service is required. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Service Lines

Piping for water service lines less than 3 inches in diameter shall be polyvinyl chloride (PVC) plastic or oriented PVC plastic polyethylene unless otherwise shown or specified.

1.2.2 Potable Water Lines

Piping and components of potable water systems which come in contact with the potable water shall conform to NSF 61.

1.2.3 Plastic Piping System

Plastic piping system components (PVC, polyethylene, thermosetting resin and reinforced plastic mortar pressure) intended for transportation of potable water shall comply with NSF 14 and be legibly marked with their symbol.

1.2.4 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02316A EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.3 UNIT PRICES

Measurement and payment will be based on completed work performed in accordance with the drawings, specifications, and the contract payment schedules. Payment will not be made under this section for excavation, trenching, or backfilling. Payment for such work will be made under Section 02316A EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

1.3.1 Measurement

The length of water lines to be paid for will be determined by measuring along the centerlines of the various sizes of pipe furnished and installed.

Pipe will be measured from center of fitting to center of fitting, from center of water distribution line to end of service connection, and from center of water distribution line to center of hydrant. No deduction will be made for the space occupied by valves or fittings.

1.3.2 Payment

Payment will be made for water lines at the contract unit price per linear foot for the various types and sizes of water lines, and will be full compensation for all pipes, joints, specials, and fittings, complete in place. Payment for fire hydrants, gate valves, valve boxes, and standard valve manholes will be made at the respective contract unit price each for such items complete in place. Payment will include the furnishing of all testing, plant, labor, and material and incidentals necessary to complete the work, as specified and as shown.

1.4 MANUFACTURER'S REPRESENTATIVE

The Contractor shall have a manufacturer's field representative present at the jobsite during the installation and testing of PE, RTRP, and/or RPMP pipe to provide technical assistance and to verify that the materials are being installed in accordance with the manufacturer's prescribed procedures. When the representative feels that the Contractor is installing and testing the PE, RTRP, and/or RPMP pipe in a satisfactory manner, certification shall be written to note which individuals employed by the Contractor are capable of properly installing the pipe. The field representative shall advise the Contractor of unsatisfactory conditions immediately when they occur. Such conditions include improper diameter of pipe ends, damaged interior liner, poorly prepared joints, improper curing of joints, moving pipe before joints are cured, bending pipe to follow abrupt changes in trench contours, leaving pipe ends open in trench overnight, not properly drying joints after rain storms, exceeding effective adhesive life, sharp objects in trench bed, backfill that could damage pipe, improper procedure for concrete encasement of pipe, omission of thrust blocks at changes in direction or any other condition which could

have an adverse effect on the satisfactory completion and operation of the piping system.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation

The manufacturer's recommendations for each material or procedure to be utilized.

Satisfactory Installation

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

SD-06 Test Reports

Bacterial Disinfection

Test results from commercial laboratory verifying disinfection.

SD-07 Certificates

Manufacturer's Representative

The name and qualifications of the manufacturer's representative and written certification from the manufacturer that the representative is technically qualified in all phases of PE, RTRP, and/or RPMP pipe laying and jointing and experienced to supervise the work and train the Contractor's field installers, prior to commencing installation.

Installation

A statement signed by the manufacturer's field representative certifying that the Contractor's personnel are capable of properly installing the pipe on the project.

Meters

Manufacturer's certificate stating that each meter furnished has been tested for accuracy of registration and compliance with the accuracy and capacity requirements of the appropriate AWWA standard.

1.6 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in

sound, undamaged condition, including no injury to the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor in a satisfactory manner, at no additional cost to the Government. No other pipe or material shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

1.6.1 Polyethylene (PE) Pipe Fittings and Accessories

PE pipe, fittings, and accessories shall be handled in conformance with AWWA C901.

1.6.2 Miscellaneous Plastic Pipe and Fittings

Polyvinyl Chloride (PVC), Reinforced Thermosetting Resin Pipe (RTRP), and Reinforced Plastic Mortar Pressure (RPMP) pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Plastic Pipe

2.1.1.1 PE Plastic Pipe

PE 3408 DR11. Pipe, tubing, and heat-fusion fittings shall conform to AWWA C901.

2.1.1.2 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B.

a. Pipe Less Than 4 inch Diameter:

(2) Elastomeric-Gasket Joint: Pipe shall be SDR 21, Class 200 pressure rated pipe as long as the working pressure does not exceed 135 psi. Joints shall provide for expansion and contraction with the use of rubber rings and tapered ends as an integral part of each full joint. Joints for Class 200 pipe shall be manufactured per ASTM D 3139. Gasket materials shall meet the requirements of ASTM F 477. Pipe shall be clearly marked with the manufacturer's name, nominal diameter, SDR, ASTM D 2241 pressure rating, and NSF approval seal.

(3) Solvent Cement Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 or ASTM D 2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

2.1.2 Ductile-Iron Pipe

Ductile-iron pipe shall conform to AWWA C151, working pressure not less than 150 psi, unless otherwise shown or specified. Pipe shall be cement-mortar lined in accordance with AWWA C104. Linings shall be standard. [AM#0002]When installed underground, pipe shall be coated in accordance with Section 13110A CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE). Flanged ductile iron pipe with threaded flanges shall be in accordance with AWWA C115.

2.1.3 Piping Beneath Tank Trails

Where pipeline passes under existing or [AM#0002]new trails, piping shall be concrete encased for distance shown on plans. Maintain 5 feet of cover from top of pipe to finish grade and 5 feet minimum encasement on either side of tank trails unless shown otherwise on drawings.

2.2 FITTINGS AND SPECIALS

2.2.1 PVC Pipe System

- a. For pipe less than 4 inch diameter, fittings for solvent cement jointing shall conform to ASTM D 2466 or ASTM D 2467; and fittings for elastomeric-gasket joint pipe shall be iron conforming to AWWA C110 or AWWA C111.
- b. For pipe 4 inch diameter and larger, fittings and specials shall be iron, bell end in accordance with AWWA C110, 150 psi pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C900. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Fittings shall be bell and spigot or plain end pipe, or as applicable. Ductile iron compact fittings shall be in accordance with AWWA C153.

2.2.2 Ductile-Iron Pipe System

Fittings and specials shall be suitable for 150 psi pressure rating, unless otherwise specified. Fittings and specials for mechanical joint pipe shall conform to AWWA C110. Fittings and specials for use with push-on joint pipe shall conform to AWWA C110 and AWWA C111. Fittings and specials for grooved and shouldered end pipe shall conform to AWWA C606. Fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Ductile iron compact fittings shall conform to AWWA C153.

2.3 JOINTS

2.3.1 Plastic Pipe Jointing

2.3.1.1 PE Pipe

Joints for pipe fittings and couplings shall be strong tight joints as specified for PE in Paragraph INSTALLATION. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendation, and as approved by the Contracting Officer.

2.3.1.2 PVC Pipe

Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer.

2.3.2 Ductile-Iron Pipe Jointing

- a. Mechanical joints shall be of the stuffing box type and shall conform to AWWA C111.
- b. Push-on joints shall conform to AWWA C111.
- c. Rubber gaskets and lubricants shall conform to the applicable requirements of AWWA C111.

2.4 VALVES

2.4.1 Gate Valves

Gate valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

- a. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.

2.4.2 Pressure Reducing Valves

Pressure reducing valves shall maintain a constant downstream pressure regardless of fluctuations in demand. Valves shall be suitable for 150 psi operating pressure on the inlet side, with outlet pressure set for 40 psi. The valves shall be of the hydraulically-operated, pilot controlled, globe or angle type, and may be actuated either by diaphragm or piston. The pilot control shall be the diaphragm-operated, adjustable, spring-loaded type, designed to permit flow when controlling pressure exceeds the spring setting. Ends shall be flanged. Valve bodies shall be bronze, cast iron or cast steel with bronze trim. Valve stem shall be stainless steel. Valve discs and diaphragms shall be synthetic rubber. Valve seats shall be bronze. Pilot controls shall be bronze with stainless steel working parts.

2.4.3 Vacuum and Air Relief Valves

Vacuum and air relief valves shall be of the size shown and shall be of a type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water and shall admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be iron body with bronze trim and stainless steel float.

2.4.4 Indicator Post for Valves

Each valve shown on the drawings with the designation "P.I.V." shall be equipped with indicator post conforming to the requirements of NFPA 24. Operation shall be by a wrench which shall be attached to each post.

2.5 VALVE BOXES

Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. Concrete boxes shall be the standard product of a manufacturer of precast concrete equipment. The word "WATER" shall be cast in the cover. The box length shall adapt, without full extension, to the depth of cover required over the pipe at the valve location.

2.6 VALVE PITS

Valve pits shall be constructed at locations indicated or as required above and in accordance with the details shown. Concrete shall have compressive strength of 3000 psi in accordance with Section 03300CAST-IN-PLACE STRUCTURAL CONCRETE.

2.7 FIRE HYDRANTS

Hydrants shall be as specified on drawings and herein. Hydrants shall have a 6 inch bell connection, two 2-1/2 inch hose connections and one 4-1/2 inch pumper connection. Outlets shall have American National Standard fire-hose coupling threads. Working parts shall be bronze. Design, material, and workmanship shall be equal to the latest stock pattern ordinarily produced by the manufacturer. Hydrants shall be painted with 1 coat of red iron oxide, zinc oxide primer conforming to SSPC Paint 25 and 2 finish coats of silicone alkyd paint conforming to SSPC Paint 21, of the installation's standard colors or as directed by the Contracting Officer. Suitable bronze adapter for each outlet, with caps, shall be furnished.

2.8 MISCELLANEOUS ITEMS

2.8.1 Service Clamps

Service clamps shall have a pressure rating not less than that of the pipe to be connected and shall be either the single or double flattened strap type. Clamps shall have a galvanized malleable-iron body with cadmium plated straps and nuts. Clamps shall have a rubber gasket cemented to the body.

2.8.2 Corporation Stops

Corporation stops shall have standard corporation stop thread conforming to AWWA C800 on the inlet end, with flanged joints, compression pattern flared tube couplings, or wiped joints for connections to goosenecks.

2.8.3 Goosenecks

Copper tubing for gooseneck connections shall conform to the applicable requirements of ASTM B 88, Type K, annealed. Length of cable requirement connections shall be in accordance with standard practice.

2.8.4 Service Stops

Service stops shall be water-works inverted-ground-key type, oval or round flow way, tee handle, without drain. Pipe connections shall be suitable for the type of service pipe used. All parts shall be of bronze with female iron-pipe-size connections or compression-pattern flared tube couplings, and shall be designed for a hydrostatic test pressure not less than 200 psi.

2.8.5 Tapping Sleeves

Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable iron, split-sleeve type with flanged or grooved outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of 150 psi. Bolts shall have square heads and hexagonal nuts. Longitudinal gaskets and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 foot-pound.

2.8.6 Service Boxes

Service boxes shall be cast iron or concrete and shall be extension service boxes of the length required for the depth of the line, with either screw or slide-type adjustment. The boxes shall have housings of sufficient size to completely cover the service stop or valve and shall be complete with identifying covers.

2.8.7 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

2.8.8 Tracer Wire

A tracer wire and marking tape shall be installed with all water service, irrigation, and distribution lines. Tracer wire shall be #10 THHN solid copper. Tracer wires shall be installed below pipe and bedding so wire is not disturbed during repairs. The tracer wire shall be continuous between valves, hand holes, and manholes. The tracer wire shall surface at each manhole, handhold, and valve box. A coil of at least one foot of wire shall be left in each manhole and valve box. The tracer wire shall be tested and proved continuous prior to final inspection of DPW. Marking tape shall be color coded, installed 12 inches below grade; foil backing is not necessary.

PART 3 EXECUTION

3.1 INSTALLATION

A statement shall be signed by the principal officer of the contracting firm stating that satisfactory installation has been achieved and is in accordance with the contract drawings and specifications, and the

manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

3.1.1 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.2 Adjacent Facilities

3.1.2.1 Sewer Lines

Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe, for a distance of at least 10 feet each side of the crossing, shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewage force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete.

3.1.2.2 Water Lines

Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2.3 Copper Tubing Lines

Copper tubing shall not be installed in the same trench with ferrous piping materials.

3.1.2.4 Nonferrous Metallic Pipe

Where nonferrous metallic pipe, e.g. copper tubing, crosses any ferrous piping material, a minimum vertical separation of 12 inches shall be maintained between pipes.

3.1.2.5 Casing Pipe

Water pipe shall be encased in a sleeve of rigid conduit for the lengths shown. Where sleeves are required, in all other cases, the pipe sleeve shall be reinforced concrete in accordance with ASTM C 76, Class V as specified for storm drains in Section 02630A STORM-DRAINAGE SYSTEM. A minimum clearance of at least 2 inches between the inner wall of the sleeve and the maximum outside diameter of the sleeved pipe and joints shall be provided. Sand bedding or suitable pipe support shall be provided for the water pipe through the sleeve.

3.1.2.6 Structures

Where water pipe is required to be installed within 3 feet of existing structures, the water pipe shall be sleeved as required in Paragraph "Casing Pipe". The Contractor shall install the water pipe and sleeve ensuring that there will be no damage to the structures and no settlement or movement of foundations or footings.

3.1.3 Joint Deflection

3.1.3.1 Allowable for Reinforced Concrete Pipe

Maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall be 5 degrees for reinforced concrete pipe unless a lesser amount is recommended by the manufacturer. Long radius curves in reinforced concrete pipe shall be formed by straight pipe in which spigot rings are placed on a bevel. Slight deflections may be made by straight pipe, provided that the maximum joint opening caused by such deflection does not exceed the maximum recommended by the pipe manufacturer. Short radius curves and closures shall be formed by shorter lengths of pipe, bevels, or fabricated specials specified.

3.1.3.2 Offset for Flexible Plastic Pipe

Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.3.3 Allowable for Ductile-Iron Pipe

The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.

3.1.4 Placing and Laying

Install pipe and appurtenances in a coarse sand envelope, with the minimum thickness of the sand envelope being at least 6 inches. Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Water-line materials shall not be dropped or dumped into the trench. Abrasion of the pipe coating shall be avoided. Except where necessary in making connections with other lines or as authorized by the Contracting Officer, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joints are complete. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by and at the Contractor's expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored, as shown.

3.1.4.1 Plastic Pipe Installation

PE Pipe shall be installed in accordance with ASTM D 2774. PVC pipe shall

be installed in accordance with AWWA M23.

3.1.4.2 Piping Connections

Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. When made under pressure, these connections shall be installed using standard methods as approved by the Contracting Officer. Connections to existing asbestos-cement pipe shall be made in accordance with ACPPA Work Practices.

3.1.4.3 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.4.4 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.5 Jointing

3.1.5.1 Reinforced Concrete Pipe Requirements

The inside and outside annular spaces between abutting sections of concrete pipe shall be filled with rich cement mortar in accordance with the pipe manufacturer's recommendations. Excess mortar shall be removed from interior annular spaces, leaving a smooth and continuous surface between pipe sections. Exposed portions of steel joint rings shall be protected from corrosion by a metallic coating or by an approved nonmetallic coating. Rubber gaskets shall be handled, lubricated where necessary, and installed in accordance with the pipe manufacturer's recommendations.

3.1.5.2 PE Pipe Requirements

Jointing shall comply with ASTM D 2657, Technique I-Socket Fusion or Technique II-Butt Fusion.

3.1.5.3 PVC Plastic Pipe Requirements

- a. Pipe less than 4 inch diameter: Preformed rubber-ring gaskets for elastomeric-gasket joints shall be made in accordance with ASTM F 477 and as specified. Pipe ends for push-on joints shall be beveled to facilitate assembly and marked to indicate when the pipe is fully seated. The gasket shall be prelubricated to prevent displacement. The gasket and ring groove in the bell or coupling shall match. The manufacturer of the pipe or fitting shall supply the elastomeric gasket. Couplings shall be provided with stops or centering rings to assure that the coupling is centered on the joint. Solvent cement joints shall use sockets conforming to ASTM D 2467. The solvent cement used shall meet the requirements of ASTM D 2564; the joint assembly shall be made in accordance with ASTM D 2855 and the manufacturer's specific recommendations.

3.1.5.4 Ductile-Iron Pipe Requirements

Mechanical and push-on type joints shall be installed in accordance with AWWA C600 for buried lines or AWWA C606 for grooved and shouldered pipe above ground or in pits.

3.1.5.5 Transition Fittings

Connections between different types of pipe and accessories shall be made with transition fittings approved by the Contracting Officer.

3.1.6 Installation of Service Lines

Service lines shall include the pipeline connecting building piping to water distribution lines to the connections with the building service at a point approximately 5 feet outside the building where such building service exists unless otherwise shown on plans. Where building services are not installed, the Contractor shall terminate the service lines approximately 5 feet from the site of the proposed building at a point designated by the Contracting Officer. Such service lines shall be closed with plugs or caps. All valves shall be provided with service boxes. Service lines shall be constructed in accordance with the following requirements:

3.1.6.1 Service Lines 2 Inches and Larger

Service lines 2 inches or larger shall be connected to the main by a reducing tee, depending on the main diameter and the service line diameter, and shall have a gate valve.

3.1.7 Setting of Fire Hydrants, Meters, Valves and Valve Boxes

3.1.7.1 Location of Fire Hydrants

Fire hydrants shall be located and installed as shown. Each hydrant shall be connected to the main with a 6 inch branch line having at least as much cover as the distribution main. Hydrants shall be set plumb with pumper nozzle facing the roadway, with the center of the lowest outlet not less than 18 inches above the finished surrounding grade, and the operating nut not more than 48 inches above the finished surrounding grade. Fire hydrants designated on the drawings as low profile shall have the lowest outlet not less than 18 inches above the finished surrounding grade, the top of the hydrant not more than 24 inches above the finished surrounding grade. Except where approved otherwise, the backfill around hydrants shall be thoroughly compacted to the finished grade immediately after installation to obtain beneficial use of the hydrant as soon as practicable. The hydrant shall be set upon a slab of concrete not less than 4 inches thick and 15 inchessquare. Not less than 7 cubic feet of free-draining broken stone or gravel shall be placed around and beneath the waste opening of dry barrel hydrants to ensure drainage.

3.1.7.2 Location of Valves

After delivery, valves, including those in hydrants, shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and hydrants and valves shall be fully opened and fully closed to ensure that all parts are in working condition. Check, pressure reducing, vacuum, and air relief valves shall be installed in valve pits. Valves and valve boxes shall be installed where shown or specified, and shall be set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each

outside gate valve unless otherwise shown. Where feasible, valves shall be located outside the area of roads and streets. Earth fill shall be tamped around each valve box or pit to a distance of 4 feet on all sides of the box, or the undisturbed trench face if less than 4 feet.

3.1.7.3 Location of Service Boxes

Where water lines are located below paved streets having curbs, the boxes shall be installed directly back of the curbs. Where no curbing exists, service boxes shall be installed in accessible locations, beyond the limits of street surfacing, walks and driveways.

3.1.8 Tapped Tees and Crosses

Tapped tees and crosses for future connections shall be installed where shown.

3.1.9 Thrust Restraint

Plugs, caps, tees and bends deflecting 11.25 degrees or more, either vertically or horizontally, on waterlines 4 inches in diameter or larger, and fire hydrants shall be provided with thrust restraints. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.9.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2,000 psi after 28 days. Blocking shall be placed between solid ground and the hydrant or fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.9.2 Restrained Joints

For ductile-iron pipe, restrained joints shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA-Restraint Design.

3.2 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.

3.2.1 Pressure Test

After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic

pressure test of 200 psi. Water supply lines designated on the drawings shall be subjected for 1 hour to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic tests may be waived by the Contracting Officer when one or more of the following conditions is encountered:

- a. Wet or unstable soil conditions in the trench.
- b. Compliance would require maintaining barricades and walkways around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.
- c. Maintaining the trench in an open condition would delay completion of the project.

The Contractor may request a waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests. Backfill placed prior to the tests shall be placed in accordance with the requirements of Section 02316A EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2.2 Leakage Test

Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than 200 psi pressure. Water supply lines designated on the drawings shall be subjected to a pressure equal to 200 psi. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

$$L = 0.0001351ND(P \text{ raised to } 0.5 \text{ power})$$

L = Allowable leakage in gallons per hour

N = Number of joints in the length of pipeline tested

D = Nominal diameter of the pipe in inches

P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Government.

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic

pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be as specified. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

- a. Pressure test and leakage test may be conducted concurrently.
- b. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

3.3 BACTERIAL DISINFECTION

3.3.1 Bacteriological Disinfection

Before acceptance of potable water operation, each unit of completed waterline shall be disinfected as prescribed by AWWA C651. From several points in the unit, the Contracting Officer will take samples of water in proper sterilized containers for bacterial examination. The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.4 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --

SECTION 02531

SANITARY SEWERS

07/02

Amendment No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(2001a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM C 150	(2002a) Portland Cement
ASTM C 270	(2002) Standard Specification for Mortar for Unit Masonry
ASTM C 33	(2002a) Concrete Aggregates
ASTM C 443	(2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 923	(2000) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C 94/C 94M	(2000e2) Ready-Mixed Concrete
ASTM C 969	(2000) Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C 972	(2000) Compression-Recovery of Tape Sealant
ASTM C 990	(2001a) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealers

[AM#0002]

ASTM D 2321	(2000) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2680	(2001) Acrylonitrile-Butadiene-Styrene

	(ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(1996a) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(2000) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
[AM#0002]ASTM D 4101	(2002) Propylene Injection and Extrusion Materials
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	(2000) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-60005	(1998) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole ++
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.27	Fixed Ladders
1.2	SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Provide building connections 4 or 6 inch lines as indicated on the sanitary sewer plans of polyvinyl chloride (PVC) plastic pipe.

Provide new and modify existing exterior sanitary gravity sewer piping and appurtenances. Provide each system complete and ready for operation. The exterior sanitary gravity sewer system includes equipment, materials, installation, and workmanship as specified herein more than 5 feet outside of building walls.

[AM#0002]

1.3 GENERAL REQUIREMENTS

The construction required herein shall include appurtenant structures and building sewers to points of connection with the building drains 5 feet outside the building to which the sewer system is to be connected. The Contractor shall replace damaged material and redo unacceptable work at no

additional cost to the Government. Excavation and backfilling is specified in Section 02316A EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Backfilling shall be accomplished after inspection by the Contracting Officer. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Precast concrete manholes

Metal items

Frames, covers, and gratings

SD-03 Product Data

Pipeline materials including joints, fittings, and couplings

Submit manufacturer's standard drawings or catalog cuts.

SD-07 Certificates

Portland Cement

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and precast manholes.

Joints

Certificates of compliance stating that the fittings or gaskets used for waste drains or lines designated on the plans are grease resistant.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

1.5.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective

coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris. Follow manufacturer's recommendations.

1.5.1.2 Metal Items

Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

1.5.1.3 Cement, Aggregate, and Reinforcement

As specified in Section 03300, "Cast-In-Place Structural Concrete."

1.5.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry, do not drag, pipe to trench.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 PVC Plastic Gravity Sewer Piping

2.1.1.1 PVC Plastic Gravity Pipe and Fittings

ASTM D 3034 with ends suitable for elastomeric gasket joints.

2.1.1.2 PVC Plastic Gravity Joints and Jointing Material

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

[AM#0002]

2.1.2 Piping Beneath Tank Trails

Where pipeline passes under existing or proposed trails, piping shall be concrete encased for distance shown on plans. Maintain 5 ft of cover from top of pipe to finish grade and 5 feet minimum concrete encasement on either side of the tank trail unless shown otherwise on plans.

2.2 CONCRETE MATERIALS

2.2.1 Cement Mortar

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.2.2 Portland Cement

Portland cement shall conform to ASTM C 150, Type II for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.

2.2.3 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94/C 94M, compressive strength of 4000 psi at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 2500 psiminimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.
Text

2.3 MISCELLANEOUS MATERIALS

2.3.1 Precast Concrete Manholes

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478; base and first riser shall be monolithic.

2.3.2 Gaskets and Connectors

Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990.

2.3.3 External Preformed Rubber Joint Seals

An external preformed rubber joint seal shall be an accepted method of sealing cast iron covers to precast concrete sections to prevent ground water infiltration into sewer systems. All finished and sealed manholes constructed in accordance with paragraph entitled "Manhole Construction" shall be tested for leakage in the same manner as pipelines as described in paragraph entitled "Leakage Tests." The seal shall be multi-section with a neoprene rubber top section and all lower sections made of Ethylene Proplene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be a non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. Extension sections shall cover up to two more adjusting rings. Properties and values are listed in the following tables:

Properties, Test Methods and Minimum Values for
Rubber used in Preformed Joint Seals

Physical Properties	Test Methods	EPDM	Neoprene	Butyl mastic
Tensile, psi	ASTM D 412	1840	2195	-
Elongation percent	ASTM D 412	553	295	350
Tear Resistance, ppi	ASTM D 624 (Die B)	280	160	-

Properties, Test Methods and Minimum Values for
Rubber used in Preformed Joint Seals

Physical Properties	Test Methods	EPDM	Neoprene	Butyl mastic
Rebound, percent, 5 minutes	ASTM C 972 (mod.)	-	-	11
Rebound, percent, 2 hours	ASTM C 972	-	-	12

2.3.4 Metal Items

2.3.4.1 Frames, Covers, and Gratings for Manholes

FS A-A-60005, cast iron; figure numbers shall be as follows:

a. Traffic manhole: Provide in paved areas.

Frame: Figure 1, Size 22A

Cover: Figure 8, Size 22A

Steps: Figure 19

b. Non-traffic manhole:

Frame: Figure 4, Size 22

Cover: Figure 12, Size 22

Steps: Figure 19

Frames and covers shall be cast iron, ductile iron or reinforced concrete. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 400 pounds. Reinforced concrete frames and covers shall be as indicated or shall conform to ASTM C 478. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.3.4.2 Manhole Steps

Zinc-coated steel conforming to 29 CFR 1910.27. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

2.3.4.3 Manhole Ladders

A steel ladder shall be provided where the depth of a manhole exceeds 12 feet. The ladder shall not be less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

2.3.5 Septic Systems

Septic tanks, drainfields, and all related materials and appurtenances included as part of the septic systems shall comply with the requirements

set forth in 30 TAC Chapter 285 for On-Site Sewage Facilities, unless otherwise shown on the plans or directed by the Contracting Officer. Septic systems must also comply with any local rules and regulations governing such. Installation of septic system is to be by registered and licensed installers per 30 TAC 285, subpart F, for onsite sewage facilities requirements.

2.3.5.1 Septic System Site Evaluation

A site evaluation was done for each potential septic field site. The results of the site evaluation are found in Tables III-1 through III-3, which are provided at the end of this specification.

Based on the results of the site evaluation, a septic field system was recommended for each site. The recommended systems are presented in Table IV-1 at the end of this specification.

2.3.6 Package Grinder Pump Station

Each pump station shall have duplex Hydromatic HPG 200M20-2 submersible grinder pumps. The wet well, accessory piping, and controls shall be, at a minimum, as specified herein or other approved equivalent as shown on the plans and details. Each pump shall be rated 2 hp, 230v, single phase, 60 hz, 3450 rpm. The unit shall produce a 10 GPM at 40 TDH.

Related force main piping outside of the pump station shall be as specified in [AM#0002]Section 02532A FORCE MAINS AND INVERTED SIPHONS; SEWER.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

Apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water main or service line. Where sanitary sewer lines pass above water lines, encase sewer in concrete for a distance of 10 feet on each side of the crossing, or substitute rubber-gasketed pressure pipe for the pipe being used for the same distance. Where sanitary sewer lines pass below water lines, lay pipe so that no joint in the sewer line will be closer than 3 feet, horizontal distance, to the water line.

a. Sanitary piping installation parallel with water line:

(1) Normal conditions: Sanitary piping or manholes shall be laid at least 10 feet horizontally from a water line whenever possible. The distance shall be measured edge-to-edge.

(2) Unusual conditions: When local conditions prevent a horizontal separation of 10 feet, the sanitary piping or manhole may be laid closer to a water line provided that:

- (a) The top (crown) of the sanitary piping shall be at least 18 inches below the bottom (invert) of the water main.
 - (b) Where this vertical separation cannot be obtained, the sanitary piping shall be constructed of AWWA-approved ductile iron water pipe pressure tested in place without leakage prior to backfilling.
 - (c) The sewer manhole shall be of watertight construction and tested in place.
- b. Installation of sanitary piping crossing a water line:
- (1) Normal conditions: Lay sanitary piping crossing water lines to provide a separation of at least 18 inches between the top of the sanitary piping and the bottom of the water line whenever possible.
 - (2) Unusual conditions: When local conditions prevent a vertical separation described above, use the following construction:
 - (a) Sanitary piping passing over or under water lines shall be constructed of AWWA-approved ductile iron water pipe, pressure tested in place without leakage prior to backfilling.
 - (b) Sanitary piping passing over water lines shall, in addition, be protected by providing:
 - 1. A vertical separation of at least 18 inches between the bottom of the sanitary piping and the top of the water line.
 - 2. Adequate structural support for the sanitary piping to prevent excessive deflection of the joints and the settling on and breaking of the water line.
 - 3. That the length, minimum 20 feet, of the sanitary piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the water line.
- c. Sanitary sewer manholes: No water piping shall pass through or come in contact with any part of a sanitary sewer manhole.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02316A, "EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS."

3.1.1.3 Pipe Laying and Jointing

Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay nonpressure pipe with the bell ends in the upgrade direction. Adjust spigots in bells to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet

apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

3.1.1.4 Connections to Existing Lines

Obtain approval from the Contracting Officer before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.3 Concrete Work

Cast-in-place concrete is included in Section 03300, "Cast-In-Place Structural Concrete."

The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.1.4 Miscellaneous Construction and Installation

3.1.4.1 Metal Work

- a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.
- b. Field painting: After installation, clean cast-iron frames, covers, gratings, and steps not buried in concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

3.1.5 Sewage Absorption Trench Construction

Grade pipe lines uniformly downward to the outlet. Lay perforated pipe

with the perforations downward. Lay drain tile with 1/4 inch open joints. Cover open joints of drain tile with the cover material specified so that it extends not less than 100 degrees on each side of the vertical center line of the tile. Wire covering in place.

3.1.6 Installations of Wye Branches

Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Tests for Nonpressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a nonpressure line for nonpressure use, test this piping as specified for nonpressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

- a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969.

-- End of Section --

SECTION 02532A

FORCE MAINS AND INVERTED SIPHONS; SEWER

07/98

Amendment No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 6D (1994; Supple 2 Dec 1997) Pipeline Valves
(Gate, Plug, Ball, and Check Valves)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1999b) Pipe, Steel, Black and Hot-Dipped,
Zinc-Coated, Welded and Seamless

ASTM C 478 (1997) Precast Reinforced Concrete Manhole
Sections

[AM#0002]ASTM D 2241 (2000) Poly(Vinyl Chloride) (PVC)
Pressure-Rated Pipe (SDR Series)

ASTM D 2464 (1999) Threaded Poly(Vinyl Chloride) (PVC)
Plastic Pipe Fittings, Schedule 80

ASTM D 2564 (1996a) Solvent Cements for Poly(Vinyl
Chloride) (PVC) Plastic Piping Systems

ASTM D 2657 (1997) Heat Fusion Joining Polyethylene
Pipe and Fittings

ASTM D 2774 (1994) Underground Installation of
Thermoplastic Pressure Piping

[AM#0002]ASTM D 3139 (1998) Joints for Plastic Pressure Pipes
Using Flexible Elastomeric Seals

ASTM D 3308 (2001) PTFE Resin Skived Tape

ASTM D 3350 (2002) Polyethylene Plastics Pipe and
Fittings Materials

[AM#0002]ASTM F 477 (1999) Elastomeric Seals (Gaskets) for
Joining Plastic Pipe

[AM#0002]

ASME INTERNATIONAL (ASME)

ASME B16.1 (1998) Cast Iron Pipe Flanges and Flanged Fittings

ASME B16.3 (1998) Malleable Iron Threaded Fittings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

[AM#0002]AWWA C111 (1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

[AM#0002]AWWA C200 (1997) Steel Water Pipe - 6 In. (150 mm) and Larger

AWWA C203 (1997) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied

AWWA C207 (1994) Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)

AWWA C208 (1996) Dimensions for Fabricated Steel Water Pipe Fittings

AWWA C210 (1997) Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines

[AM#0002]AWWA C500 (1993; C500a) Metal-Seated Gate Valves for Water Supply Service

AWWA C508 (1993; C508a) Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS

AWWA C600 (1993) Installation of Ductile-Iron Water Mains and Their Appurtenances

[AM#0002]

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-Restraint Design (1997) Thrust Restraint Design for Ductile Iron Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-78 (1998) Cast Iron Plug Valves, Flanged and Threaded Ends

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Hydrostatic Tests[AM#0002]

Copies of test results.

1.3 DELIVERY AND STORAGE

Pipe, fittings and accessories, and pipe coatings shall not be damaged during delivery, handling, and storage.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

Piping for force mains less than 4 inches in diameter shall be galvanized steel, polyvinyl chloride (PVC) plastic, polyethylene (PE) plastic or polypropylene plastic. Piping less than 4 inches in diameter inside pump stations shall be galvanized steel. [AM#0002]Pipe shall conform to the respective specifications and other requirements specified below.

[AM#0002]2.1.1 Plastic Pipe

[AM#0002]

Force main pipe and fittings following lift stations shown on plans shall be either 2 inch PVC Class 200 SDR 21 in accordance with ASTM D 2241 or 2 inch HDPE SDR 17 in accordance with ASTM D 3350.

2.1.2 Steel Pipe

- a. Steel Pipe, 6 inches Diameter and Larger: AWWA C200.
- b. Steel Pipe Less Than 6 inches Diameter: ASTM A 53, standard weight, threaded end, galvanized.
- c. Fittings, 6 inches Diameter and Larger: AWWA C200, fabricated in compliance with AWWA C208.
- d. Fittings Less Than 6 inches Diameter: ASME B16.3, galvanized.

2.2 JOINTS

2.2.1 PE Piping

- a. Heat Fusion Joints: ASTM D 2657.
- b. Flanged Joints: ASME B16.1 or AWWA C207.
- c. Mechanical Joints: ASME B16.1.

2.2.2 Polypropylene Piping

Heat Fusion Joints: ASTM D 2657.

2.2.3 PVC Piping

- a. Screw Joint Fittings: ASTM D 2464, Schedule 80.
- b. Push-On Joint Fittings: ASTM D 3139, with ASTM F 477gaskets.

- c. Solvent Cement: ASTM D 2564.
- d. Couplings for use with plain end pipe shall have centering rings or stops to ensure the coupling is centered on the joint.

2.2.4 PVC Pipe

Joints shall conform to ASTM D 3139. Elastomeric gaskets shall conform to ASTM F 477.

[AM#0002]2.2.5 Steel Piping

- a. Push-on Joints: AWWA C200.
- b. Mechanical Joints: AWWA C200.
- c. Flanged Joints: AWWA C207.

[AM#0002]2.3 VALVES

2.3.1 Gate Valves

Gate valves 3 inches and larger shall comply with AWWA C500. Valves for buried service shall be non-rising stem (NRS), 2 inch square nut operated with joints applicable to the pipe or installation. Buried valves shall be furnished with extension stems comprising socket, extension stem and operating nut, and shall be of an appropriate length to bring operating nut to within 6 inches of grade. One 4 foot "T" handle valve wrench shall be furnished for each quantity of 6 buried valves. Gate valves that are exposed or installed inside shall be outside screw and yoke (OS&Y), handwheel operated with flange ends unless otherwise indicated. Gate valve operating nuts and handwheels shall have an arrow and the word "OPEN" cast in raised letters to indicate the direction of opening. Gate valves 14 inches and larger shall be equipped with gearing to reduce operating effort. Gate valves 14 inches and larger installed in horizontal lines in horizontal position with stems horizontal shall be equipped with bronze track, roller and scrapers to support the weight of the gate for its full length of travel. Gate valves 14 inches and larger installed in vertical pipe lines with stems horizontal shall be fitted with slides to assist the travel of the gate assembly.

2.3.2 Check Valves

Check valves shall permit free flow of sewage forward and provide a positive check against backflow. Check valves shall be designed for a minimum working pressure of 150 psi or as indicated. The body shall be iron. The manufacturer's name, initials, or trademark and also the size of the valve, working pressure, and direction of flow shall be directly cast on the body.

- a. Ball Check Valves shall be iron body, shall have flanged ends, and shall be the non-slam type. Flanges shall be the 125 pound type complying with ASME B16.1. Ball shall be stainless steel unless otherwise specified.
- b. Swing Check Valves shall comply with AWWA C508 and shall be iron body, bronze mounted, and shall have flanged ends. Flanges shall be the 125 pound type complying with ASME B16.1.

2.3.3 Plug Valves

Cast iron valves shall comply with MSS SP-78. Steel plug valves shall comply with API Spec 6D.

2.3.4 Pinch Valves

Pinch valves shall be double acting, jam-proof type with unobstructed streamlined flows and built-in operator. The body shall be iron with a non-rising handwheel. The sleeve shall be of pure gum rubber, neoprene, Buna N or hypalon as required for service. The valve shall have flanged ends. Flanges shall be of the 125 pound type complying with ASME B16.1.

2.3.5 Air Release Valves

Air release valves shall be designed to permit release of air from an empty pipe during filling and shall be capable of discharging accumulated air in the line while the line is in operation and under pressure. Valves shall be attached by means of threaded pipe connections. Valves shall be vented to the atmosphere.

- a. Manual Air Release Valves: Manual air release valves shall consist of a 3 inch gate valve and 3 inch ductile iron pipe and fittings. The valve shall be installed with its line of flow in the horizontal position.
- b. Automatic Air Release Valve: Automatic air release valves shall be of the compound lever type capable of withstanding operating pressures of 150 psi. The valves shall have a 1/2 inch outlet. The body and cover of the valve shall be of iron with a stainless steel float. All internal parts shall be stainless steel or bronze. The valve shall be specifically adapted for use with sewage. Each valve shall be complete with hose and blow-off valves to permit backflushing without dismantling the valve.

2.4 VALVE BOXES

Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subject to vehicular traffic. Cast iron boxes shall be the extension type with slide type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. The box length shall be adaptable, without full extension, to the depth of cover over the pipe at the valve locations. Concrete boxes shall be the standard product of a manufacturer of precast concrete equipment. The word "SEWER" shall be cast in the cover.

2.5 VALVE VAULTS

Valve vaults shall be precast concrete units conforming to ASTM C 478.

2.6 MISCELLANEOUS MATERIALS

Miscellaneous materials shall comply with the following requirements:

2.6.1 Pipe Coatings and Linings

- a. Steel, interior: AWWA C203 or AWWA C210.
- b. Steel, exterior, buried: AWWA C203.

c. Steel, exterior, exposed: AWWA C210.

2.6.2 Joint Lubricants

Joint lubricants shall be as recommended by the pipe manufacturer.

2.6.3 Bolts, Nuts and Glands

AWWA C111.

2.6.4 Joint Compound

A stiff mixture of graphite and oil or inert filler and oil.

2.6.5 Joint Tape

ASTM D 3308.

2.6.6 Bond Wire

Bond wire type RHW or USE, Size 1/0 AWG, neoprene jacketed copper conductor shaped to stand clear of the joint.

PART 3 EXECUTION

3.1 INSTALLATION

Pipe, pipe fittings, and appurtenances shall be installed at the locations indicated. Excavation, trenching, and backfilling shall be as specified in Section 02316A EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS.

3.1.1 Adjacent Facilities

Installation of force mains and inverted siphons near adjacent facilities shall be as specified in Section 02531 SANITARY SEWERS.

3.1.2 Cutting

Pipe shall be cut in a neat manner with mechanical cutters. Wheel cutters shall be used where practicable. Sharp and rough edges shall be ground smooth and loose material removed from the pipe before laying.

3.1.3 Laying

Except where otherwise authorized, pipe shall be laid with bells facing the direction of laying. Before lowering and while suspended, the pipe shall be inspected for defects. Defective material shall be rejected. Pipe shall be laid in compliance with the following:

- a. Ductile Iron: AWWA C600.
- b. Steel: AWWA C600.
- c. Concrete: Manufacturer's instructions.
- d. Polyvinyl Chloride: Manufacturer's instructions.
- e. Polyethylene: ASTM D 2774.

- f. Polypropylene: ASTM D 2774.
- g. Reinforced Thermosetting Resin: Manufacturer's instructions.
- h. Reinforced Plastic Mortar: Manufacturer's Instructions.

3.1.4 Jointing

[AM#0002]3.1.4.1 Joints for PE Pipe

Heat fusion joints shall comply with the manufacturer's instructions concerning equipment, temperature, melt time, heat coat, and joining time. Flanged and mechanical joints shall be made in compliance with the manufacturer's instructions.

3.1.4.2 Joints for Polypropylene Pipe

Heat fusion joints shall comply with the manufacturer's instructions concerning equipment, temperature, melt time, heat coat, and joining time.

3.1.4.3 Joints for PVC Pipe

- a. Threaded joints shall be made by wrapping the male threads with joint tape or by applying an approved thread lubricant, then threading the joining members together. The joint shall be tightened with strap wrenches which will not damage the pipe and fittings. The joint shall be tightened no more than 2 threads past hand-tight.
- b. Push-on joints: The ends of pipe for push-on joints shall be beveled to facilitate assembly. Pipe shall be marked to indicate when the pipe is fully seated. The gasket shall be lubricated to prevent displacement. The gasket shall remain in proper position in the bell or coupling while the joint is made.
- c. Solvent-weld joints shall comply with the manufacturer's instructions.

[AM#0002]3.1.4.4 Joints for Steel Pipe

Screw joints shall be made tight with joint tape or joint compound applied with a brush to the male threads only. Installation of mechanical joints, push-on joints, and flanged joints shall comply with the manufacturer's instructions.

3.1.5 Coating and Lining

Field coating of non-galvanized steel pipe shall comply with AWWA C203. The applied materials shall be tested by means of a spark-type electrical device in compliance with AWWA C203. Flaws and holidays in the coating or lining of the pipe and the pipe joints shall be repaired; the repaired areas shall be at least equal in thickness to the minimum required for the pipe.

3.1.6 PE Pipe Encasement

When installed underground, pipe shall be encased [AM#0002]as shown on plans or otherwise specified by the Contracting Officer.

3.1.7 Installation of Valves

Prior to installation, valves shall be cleaned of all foreign matter and inspected for damage. Valves shall be fully opened and closed to ensure that all parts are properly operating. Valves shall be installed with the stem in the vertical position. [AM#0002]Valves shall be installed in valve vaults as indicated.

3.1.8 Installation of Valve Boxes

Valve boxes shall be installed over each outside gate valve, unless otherwise indicated. Valve boxes shall be centered over the valve. Fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides or to undisturbed trench face, if less than 4 feet.

3.1.9 Installation of Valve Vaults

Valve vaults shall be installed as indicated.

3.1.10 Drain Lines

Drain lines shall be installed where indicated. The drain line shall consist of a tee in the main line with a 4 inch diameter branch, a 4 inch diameter elbow, and a 4 inch gate valve.

3.1.11 Thrust Restraint

[AM#0002]Thrust Restraint shall be as specified in Section 02510A WATER DISTRIBUTION SYSTEM. Plugs, caps, tees and bends deflecting 11-1/4 degrees or more, either vertically or horizontally, shall be provided with thrust restraint. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.11.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2000 psi after 28 days. Blocking shall be placed between solid ground and the fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.11.2 Restrained Joints

For ductile iron pipe, restrained joints shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA-Restraint Design.

3.1.12 Grout

Grout for exterior joint protection on concrete pipes shall be a mix of 1 part portland cement, 2 parts sand, and of sufficient liquid consistency to

flow into the joint recess beneath the diaper. Grout for interior joint protection shall be a mix of 1 part portland cement and 1 part sand. A polyurethane foam loop, impregnated with portland cement, may be substituted for grout for exterior joints.

3.1.13 Bonded Joints

Where indicated, a metallic bond shall be provided at each joint, including joints made with flexible couplings or rubber gaskets, of ferrous-metallic piping to effect continuous conductivity. The bond shall be of the thermal-weld type.

3.2 HYDROSTATIC TESTS

The pipeline shall be subjected to both a pressure test and a leakage test. [AM#0002]Testing shall be the responsibility of the Contractor. The Contracting Officer shall be notified at least 7 days in advance of equipment tests. The final test report shall be delivered to the Contracting Officer within 30 days of the test.

3.2.1 Pressure Test

After the pipe has been installed, joints completed, thrust blocks have been in place for at least five days, and the trench has been partially backfilled, leaving the joints exposed for examination, the pipe shall be filled with water to expel all air. The pipeline shall be subjected to a test pressure of 100 psi or 150 percent of the working pressure, whichever is greater, for a period of at least one hour. Each valve shall be opened and closed several times during the test. The exposed pipe, joints, fitting, and valves shall be examined for leaks. Visible leaks shall be stopped or the defective pipe, fitting, joints, or valve shall be replaced.

3.2.2 Leakage Test

The leakage test may be conducted subsequent to or concurrently with the pressure test. The amount of water permitted as leakage for the line shall be placed in a sealed container attached to the supply side of the test pump. No other source of supply will be permitted to be applied to the pump or line under test. The water shall be pumped into the line by the test pump as required to maintain the specified test pressure as described for pressure test for a 2 hour period. Exhaustion of the supply or the inability to maintain the required pressure will be considered test failure. PE pipe can experience diametric expansion and pressure elongation during initial testing. The manufacturer shall be consulted prior to testing for special testing considerations. Allowable leakage shall be determined by the following I-P formula:

$L = NDP/K$ Where:

L = Allowable leakage in gallons per hour.

N = Number of joints in length of pipeline tested.

D = Nominal diameter of the pipe in inches.

P = Square root of the test pressure in psig.

K = 7400 for pipe materials.

At the conclusion of the test, the amount of water remaining in the container shall be measured and the results recorded in the test report.

3.2.3 Retesting

If any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be reconducted until the results of the tests are within specified allowances, without additional cost to the Government.

-- End of Section --

SECTION 12320A

CABINETS AND COUNTERTOPS

05/98

Amendement No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.9 (1994) Cabinet Hardware

KITCHEN CABINET MANUFACTURERS ASSOCIATION (KCMA)

KCMA A161.1 (1995) Performance & Construction
Standards for Kitchen and Vanity Cabinets

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3 (1995) High-Pressure Decorative Laminates

1.2 DESIGN

Cabinets shall be wood, factory-fabricated and finished in the manufacturer's standard sizes and finishes of the type, design, and configuration indicated. Cabinets shall be constructed as specified and shall meet the requirements of KCMA A161.1. Wall and base cabinet assemblies shall consist of individual units joined into continuous sections. Fastenings shall be accomplished to permit removal and replacement of individual units without affecting the remainder of the installation. Counters shall be provided with watertight sink rim when indicated. Drawers shall be removable and shall be equipped with position stops to avoid accidental complete withdrawals. Shelves shall be fixed or adjustable as indicated.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G

Drawings showing each type of cabinet and related item, and clearly indicating the complete plan, location, and elevations of the cabinets and accessories and pertinent details of construction, fabrication, and attachments.

SD-03 Product Data

Cabinets; G
Countertops and Backsplash; G

Manufacturer's printed data, catalog cuts, installation and cleaning instructions.

SD-06 Test Reports

Cabinets and Countertops; G

Test reports certifying that all cabinets comply with the requirements of KCMA A161.1. Tests shall be conducted by independent laboratories approved by KCMA. KCMA certification seals affixed to the cabinets will be accepted in lieu of certified test reports.

1.4 DELIVERY AND STORAGE

Cabinets and countertops shall be delivered to the jobsite wrapped in a protective covering. Cabinets shall be stored in accordance with manufacturer's recommendations in an adequately ventilated, dry location that is free of dust, water, or other contaminants and in a manner to permit access for inspection and handling. Cabinets shall be handled carefully to prevent damage to the surfaces. Damaged items that cannot be restored to like-new condition shall be replaced.

PART 2 PRODUCTS

2.1 CABINETS

Base and wall cabinets and countertops for the Visitor's Center Guard Gatehouses and Truck Inspection Office Building, except for custom casework of the issue counter in the Visitor Center and work counters in Guard Gatehouses as noted in Section 06410, shall be as described in this section.

Wall and base cabinets shall be of the same construction and same outside appearance. Door design shall be solid flush face from vendors standard styles. Shelves shall be fixed or fully adjustable as indicated. Adjustable shelves shall be capable of adjusting on approximately 3 inch increments. Shelves shall be supported by self-locking clips or wood dowels. Dowels shall be approximately 5/16 inch in diameter by 1-9/16 inches long. Dowels shall be inserted into borings for the shelf adjustments. Shelves shall be minimum 1/2 inch thick plywood or minimum 1/2 inch thick 45 pound density particle board. Drawer fronts shall be 45 pound density particle board or hardwood plywood to match cabinet door construction.

2.1.1 Frame Type Cabinets

The cabinets shall be constructed with frame fronts and solid ends, or frame construction throughout. Frame members shall be 3/4 inch thick by 1-1/2 inch wide; kiln-dried hardwood, glued together, and shall be either mortised and tenoned, dovetailed or doweled, nailed, stapled or screwed. Top and bottom corners shall be braced with either hardwood blocks that are glued together with water resistant glue and nailed in place, or metal or plastic corner braces. Backs of wall cabinets shall be 1/8 inch thick

plywood, tempered hardboard or 3/8 inch thick, 45 pound density particle board. Backs of base and tall cabinets shall be 3/8 inch thick hardwood or 3/8 inch thick, 45 pound density particle board. Bottoms of cabinets shall be minimum 3/8 inch thick plywood sound grade and shall be braced with wood members glued in place. Cabinet ends shall be 5/8 inch thick, 45 pound density particle board core.

2.2 COUNTERTOPS AND BACKSPLASH

2.2.1 High-Pressure Laminated Plastic Clad Countertops

Clad countertop and backsplash shall be constructed of 3/4 inch thick plywood or 3/4 inch thick, 45 pound density particle board core and shall be post formed cove type. Cove type shall be a single unit with self-edging and plastic laminate coved at the juncture of the countertop and backsplash. Edging and trim shall consist of plastic laminate cut and fitted to all exposed edges. End splashes constructed of 3/4 inch plywood or 3/4 inch thick, 45 pound density particle board core shall be supplied. Continuous sheets of longest lengths practicable shall be provided. Joints in surface sheeting shall be tight and flush and held to a practicable minimum. When the countertop and backsplash are two separate units, GP50 plastic laminate shall be used. When the countertop and backsplash are one unit, PF42 plastic laminate shall be used. Plastic laminate shall conform to the requirements of NEMA LD 3 and plastic laminate adhesive shall be contact type applied to both surfaces. For fully formed and cove type countertops, the post-forming plastic laminate shall not be bent to a radius smaller than the limit recommended by the plastic manufacturer.

2.3 Sink/Lavatory Rims

Sink/lavatory rims shall be of the corrosion resistant steel clamping type, sized to the sink, and a standard product of a manufacturer regularly producing this type of equipment.

2.4 FINISH

2.4.1 Cabinet Finish

Cabinets shall be provided with a factory-applied durable finish in accordance with KCMA A161.1 requirements and of a type standard with the manufacturer. [AM#0002]All exposed exterior surfaces shall be plastic laminate finish. Plastic laminate shall conform to the requirements of NEMA LD 3.

2.4.2 Melamine Laminated Interior Cabinet Finish

Plywood, particle board or tempered hardboard cabinet backs shall be finished with a melamine laminate on the exposed side. Particle board shelves shall be covered on both sides with a laminated melamine finish. Melamine laminate shall conform to the requirements of NEMA LD 3 and laminate adhesive shall be contact type applied to both surfaces.

2.4.3 Backer Sheets

Backer Sheets of high pressure plastic laminate, shall conform to NEMA LD 3, Grade BK20 and shall be applied to the underside of all core material.

2.5 HARDWARE

Hardware shall conform to BHMA A156.9, shall be suitable for kitchen cabinet use, and shall include all miscellaneous hardware for a complete installation. Door hinges shall be self-closing type. Drawer runners shall have nylon rollers standard with the manufacturer. Hardware and fastenings for doors and drawers with particle board cores shall be of the through-bolt type.

2.6 COLOR, TEXTURE, AND PATTERN

Design, color, and finish shall be selected from manufacturer's standard.

PART 3 EXECUTION

3.1 INSTALLATION

Cabinets shall be installed level, plumb, and true to line, and shall be attached to the walls or floors with suitable devices to securely anchor each unit. Countertops, accessories, and hardware shall be installed as indicated on the drawings. Installation shall be in accordance with the manufacturer's approved printed instructions. The inner edge of sink cut-outs in laminated plastic tops shall be painted with a coat of semigloss enamel paint and sink flanges shall be set in a bed of sealant. Closer and filler strips and finish moldings shall be provided as required. Prior to final acceptance, doors shall be aligned, and hardware shall be adjusted.

3.2 CLEANING

Cabinet and countertop surfaces shall be cleaned in accordance with manufacturer's instructions.

-- End of Section --

SECTION 13110A

CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE)

11/98

Amendment No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|-------------|---|
| ASTM B 418 | (1995a) Cast and Wrought Galvanic Zinc Anodes |
| ASTM B 843 | (1993; R 1998) Magnesium Alloy Anodes for Cathodic Protection |
| ASTM D 1248 | (1998) Polyethylene Plastics Molding and Extrusion Materials |

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

- | | |
|---------------------|---|
| [AM#0002]49 CFR 192 | Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards |
|---------------------|---|

[AM#0002]

NACE INTERNATIONAL (NACE)

- | | |
|-------------|--|
| NACE RP0169 | (1996) Control of External Corrosion on Underground or Submerged Metallic Piping Systems |
| NACE RP0177 | (1995) Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems |
| NACE RP0188 | (1999) Discontinuity (Holiday) Testing of Protective Coatings |
| NACE RP0190 | (1995) External Protective Coatings for Joints, Fittings, and Valves on Metallic Underground or Submerged Pipelines and Piping Systems |

[AM#0002]

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- | | |
|-----------|---|
| NEMA TC 2 | (1998) Electrical Polyvinyl Chloride (PVC) Tubing and Conduit |
| NEMA WC 5 | (1992; Rev 2, 1996) |

Thermoplastic-Insulated Wire and Cable for
the Transmission and Distribution of
Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 6 (1997) Rigid Metal Conduit

UL 510 (1994; Rev thru Apr 1998) Polyvinyl
Chloride, Polyethylene, and Rubber
Insulating Tape

UL 514A (1996; Rev Dec 1999) Metallic Outlet Boxes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Drawings; G[AM#0002]

[AM#0002]Six copies of detail drawings consisting of a complete list of equipment and material including manufacturer's descriptive and technical literature, catalog cuts, results of system design calculations including soil-resistivity, installation instructions and certified test data stating the maximum recommended anode current output density and the rate of gaseous production if any at that current density. Detail drawings shall contain complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will function properly as a unit.

Contractor's Modifications; G[AM#0002]

[AM#0002]Six copies of detail drawings showing proposed changes in location, scope of performance indicating any variations from, additions to, or clarifications of contract drawings. The drawings shall show proposed changes in anode arrangement, anode size and number, anode materials and layout details, conduit size, wire size, mounting details, wiring diagram, method for electrically-isolating each pipe, and any other pertinent information to proper installation and performance of the system.

SD-03 Product Data

Equipment; G[AM#0002]

Within [AM#0002]30 days after receipt of notice to proceed, an itemized list of equipment and materials including item number, quantity, and manufacturer of each item. The list shall be

accompanied by a description of procedures for each type of testing and adjustments, including testing of coating for thickness and holidays. Installation of materials and equipment shall not commence until this submittal is approved.

Spare Parts[AM#0002]

Spare parts data for each different item of material and equipment specified, after approval of detail drawings and not later than six (6) months prior to the date of beneficial occupancy. The data shall include a complete list of parts, special tools, and supplies, with current unit prices and source of supply. One (1) spare anode of each type shall be furnished.

SD-06 Test Reports

Tests and Measurements; G[AM#0002]

Test reports in booklet form tabulating all field tests and measurements performed, upon completion and testing of the installed system and including close interval potential survey, casing and interference tests, final system test verifying protection, insulated joint and bond tests, and holiday coating test. A certified test report showing that the connecting method has passed a 120-day laboratory test without failure at the place of connection, wherein the anode is subjected to maximum recommended current output while immersed in a three percent sodium chloride solution.

Contractor's Modifications; G[AM#0002]

Final report regarding Contractor's modifications. The report shall include pipe-to-soil measurements throughout the affected area, indicating that the modifications improved the overall conditions, and current measurements for anodes. The following special materials and information are required: taping materials and conductors; zinc grounding cell, installation and testing procedures, and equipment; coating material; system design calculations for anode number, life, and parameters to achieve protective potential; backfill shield material and installation details showing waterproofing; bonding and waterproofing details; insulated resistance wire; exothermic weld equipment and material.

SD-07 Certificates

Cathodic Protection System[AM#0002]

Proof that the materials and equipment furnished under this section conform to the specified requirements contained in the referenced standards or publications. The label or listing by the specified agency will be acceptable evidence of such compliance.

Services of "Corrosion Expert"; G[AM#0002]

Evidence of qualifications of the "corrosion expert."

a. The "corrosion expert's" name and qualifications shall be certified in writing to the Contracting Officer prior to the start of construction.

b. Certification shall be submitted giving the name of the firm, the number of years of experience, and a list of not less than five (5) of the firm's installations three (3) or more years old that have been tested and found satisfactory.

SD-10 Operation and Maintenance Data

Cathodic Protection System[AM#0002]

Before final acceptance of the cathodic protection system, [AM#0002]six copies of operating manuals outlining the step-by-step procedures required for system startup, operation, adjustment of current flow, and shutdown. The manuals shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. [AM#0002]Six copies of maintenance manual, listing routine maintenance procedures, recommendation for maintenance testing, possible breakdowns and repairs, and troubleshooting guides. The manuals shall include single-line diagrams for the system as installed; instructions in making pipe-to-reference cell and tank-to-reference cell potential measurements and frequency of monitoring; instructions for dielectric connections, interference and sacrificial anode bonds; instructions shall include precautions to ensure safe conditions during repair of pipe or other metallic systems. The instructions shall be neatly bound between permanent covers and titled "Operating and Maintenance Instructions." These instructions shall be submitted for the Contracting Officer's approval. The instructions shall include the following:

a. As-built drawings, to scale of the entire system, showing the locations of the piping, location of all anodes and test stations, locations of all insulating joints, and structure-to-reference cell potentials as measured during the tests required by Paragraph: TESTS AND MEASUREMENTS, of this section.

b. Recommendations for maintenance testing, including instructions in making pipe-to-reference cell potential measurements and frequency of testing.

c. All maintenance and operating instructions and nameplate data shall be in English.

d. Instructions shall include precautions to insure safe conditions during repair of pipe system.

Training Course[AM#0002]

The proposed Training Course Curriculum (including topics and dates of discussion) indicating that all of the items contained in the operating and maintenance instructions, as well as demonstrations of routine maintenance operations, including testing procedures included in the maintenance instructions, are to be covered.

1.3 GENERAL REQUIREMENTS

The Contractor shall furnish and install a complete, operating, sacrificial anode cathodic protection system in complete compliance with NFPA 70, with all applicable Federal, State, and local regulations and with minimum requirements of this contract. In addition to the minimum requirements of these specifications, [AM#0002]construction of gas pipelines and associated cathodic protection systems shall be in compliance with 49 CFR 192. The services required include planning, installation, adjusting and testing of a cathodic protection system, using sacrificial anodes for cathodic protection of the [AM#0002]Water, Force Main, and Gas lines, their connectors and lines under the slab or floor foundation. The cathodic protection system shall include anodes, cables, connectors, corrosion protection test stations, and any other equipment required for a complete operating system providing the NACE criteria of protection as specified. Insulators are required whenever needed to insulate the pipes from any other structure. [AM#0002]The cathodic protection shall be provided on [AM#0002]Water, Fire Protection, Force Main, and Gas pipes.

1.3.1 Services of "Corrosion Expert"

The Contractor shall obtain the services of a "corrosion expert" to supervise, inspect, and test the installation and performance of the cathodic protection system. "Corrosion expert" refers to a person, who by thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. The "corrosion expert" shall make at least 3 visits to the project site. The first of these visits shall include obtaining soil resistivity data, acknowledging the type of pipeline coatings to be used and reporting to the Contractor the type of cathodic protection required. Once the submittals are approved and the materials delivered, the "corrosion expert" shall revisit the site to ensure the Contractor understands installation practices and laying out the components. The third visit shall involve testing the installed cathodic protection systems and training applicable personnel on proper maintenance techniques. The "corrosion expert" shall supervise installation and testing of all cathodic protection.

1.3.2 Contractor's Modifications

The specified system is based on a complete system with magnesium sacrificial anodes. The Contractor may modify the cathodic protection system after review of the project, site verification, and analysis, if the proposed modifications include the anodes specified and will provide better overall system performance. The modifications shall be fully described, shall be approved by the Contracting Officer's representative, and shall meet the following criteria. The proposed system shall achieve a minimum pipe-to-soil "instant off" potential of minus 850 millivolts with reference to a saturated copper-copper sulfate reference cell on the underground components of the piping or other metallic surface. The Contractor shall take resistivity measurements of the soil in the vicinity of the pipes and ground bed sites. Based upon the measurements taken, the current and

voltage shall be required to produce a minimum of minus 850 millivolts "instant off" potential between the structure being tested and the reference cell. This potential shall be obtained over 95 percent of the metallic area. The anode system shall be designed for a life of twenty-five (25) years of continuous operation.

1.3.3 Isolators

Isolators are required to insulate the indicated pipes from any other structure. Isolators shall be provided with lightning protection and a test station as shown.

1.3.4 Anode and Bond Wires

A minimum of [AM#0002]5 magnesium anodes with an unpackaged weight of [AM#0002] 9 pounds shall be provided uniform distances along the metallic pipe lines. A minimum of [AM#0002]3 test stations shall be used for these anodes. These anodes shall be in addition to anodes for the pipe under concrete slab and casing requirements. For each cathodic system, the metallic components and structures to be protected shall be made electrically continuous. This shall be accomplished by installing bond wires between the various structures. Bonding of existing buried structures may also be required to preclude detrimental stray current effects and safety hazards. Provisions shall be included to return stray current to its source without damaging structures intercepting the stray current. The electrical isolation of underground facilities in accordance with acceptable industry practice shall be included under this section. All tests shall be witnessed by the Contracting Officer.

1.3.5 Surge Protection

Approved zinc grounding cells or sealed weatherproof lightning arrestor devices shall be installed across insulated flanges or fittings installed in underground piping as indicated on the drawings. The arrestor shall be gapless, self-healing, solid state type. Zinc anode composition shall conform to ASTM B 418, Type II. Lead wires shall be number 6 AWG copper with high molecular weight polyethylene (HMWPE) insulation. The zinc grounding cells shall not be prepackaged in backfill but shall be installed as detailed on the drawings. Lightning arrestors or zinc grounding cells are not required for insulated flanges on metallic components used on nonmetallic piping systems.

1.3.6 Summary of Services Required

The scope of services shall include, but shall not be limited to, the following:

- a. Close-interval potential surveys.
- b. Cathodic Protection Systems.
- c. System testing.
- d. Casing corrosion control.
- e. Interference testing.
- f. Training.

- g. Operating and maintenance manual.
- h. Insulator testing and bonding testing.
- i. Coating and holiday testing shall be submitted within 45 days of notice to proceed.

1.3.7 Nonmetallic Pipe System

In the event pipe other than metallic pipe is approved and used in lieu of metallic pipe, all metallic components of this pipe system shall be protected with cathodic protection. Detailed drawings of cathodic protection for each component shall be submitted to the Contracting Officer for approval within 45 days after date of receipt of notice to proceed, and before commencement of any work.

1.3.7.1 Coatings

Coatings for metallic components shall be as required for metallic fittings. Protective covering (coating and taping) shall be completed and tested on each metallic component (such as valves, hydrants and fillings). This covering shall be as required for underground metallic pipe. Each test shall be witnessed by the Contracting Officer. Coatings shall be selected, applied, and inspected in accordance with NACE RP0190 and as specified in these specifications. The use of nonmetallic pipe does not change other requirements of the specifications. Any deviations due to the use of nonmetallic pipe shall be submitted for approval.

1.3.7.2 Tracer Wire

When a nonmetallic pipe line is used to extend or add to an existing metallic line, an insulated No. 8 AWG copper wire shall be thermit-welded to the existing metallic line and run the length of the new nonmetallic line. This wire shall be used as a locator tracer wire and to maintain continuity to any future extensions of the pipe line.

1.3.8 Tests of Components

A minimum of four (4) tests shall be made at each metallic component in the piping system. Two (2) measurements shall be made directly over the anodes and the other two (2) tests shall be over the outer edge of the component, but at the farthest point from the anodes. Structure and pipes shall be shown with the cathodic protection equipment. All components of the cathodic protection system shall be shown on drawings, showing their relationship to the protected structure or component. A narrative shall describe how the cathodic protection system will work and provide testing at each component. Components requiring cathodic protection shall include but not be limited to the following:

- a. Pipes under the floor slab or foundations.
- b. PIV.
- c. Shutoff valves.
- d. Metallic pipe extended from aboveground locations.
- e. Each connector or change-of-direction device.

- f. Any metallic pipe component or section.
- g. Backflow preventor.
- h. Culvert.

1.3.9 Drawings

Detailed drawings shall be provided showing location of anodes, insulated fittings, test stations, permanent reference cells, and bonding. Locations shall be referenced to two (2) permanent facilities or mark points.

1.3.10 Electrical Potential Measurements

All potential tests shall be made at a minimum of 10 foot intervals witnessed by the Contracting Officer. Submittals shall identify test locations on separate drawing, showing all metal to be protected and all cathodic protection equipment. Test points equipment and protected metal shall be easily distinguished and identified.

1.3.11 Achievement of Criteria for Protection

All conductors, unless otherwise shown, shall be routed to or through the test stations. Each system provided shall achieve a minimum pipe-to-soil "instant off" potential of minus 850 millivolt potentials with reference to a saturated copper-copper-sulfate reference cell on all underground components of the piping. Based upon the measurements taken, the current and voltage of the anodes should be adjusted as required to produce a minimum of minus 850 millivolts "instant off" potential between the structure being tested and the reference cell. This potential should be obtained over 95 percent of the metallic area. This must be achieved without the "instant off" potential exceeding 1150 millivolts. Testing will be witnessed by the Contracting Officer. Additional anodes shall be provided by the Contractor if required to achieve the minus 850 millivolts "instant off". Although acceptance criteria of the cathodic protection systems are defined in NACE RP0169, for this project the "instant off" potential of minus 850 millivolts is the only acceptable criteria.

1.3.12 Metallic Components and Typical

- a. Metallic components: As a minimum, each metallic component shall be protected with two (2) magnesium anodes. This number of anodes is required to achieve minus 850 millivolts "instant off" potential on the metallic area and at the same time not provide overvoltage above 1150 millivolts "instant off." As a minimum, the magnesium anode unpackaged weight shall be [AM#0002]9 pounds. The magnesium anodes shall be located on each side of the metallic component and routed through a test station.
- b. Fire Hydrants: Fire hydrant pipe components shall have a minimum of two (2) anodes. These magnesium anodes shall have an unpackaged weight of 17 pounds.
- c. Pipe Under Concrete Slab: Pipe under concrete slab shall have a minimum of [AM#0002]2 magnesium anodes. These magnesium anodes shall have an unpackaged weight of [AM#0002]9 pounds. Pipe under concrete slab shall have [AM#0002]1 permanent reference electrode located under the slab. One (1) permanent reference electrode shall be located where the pipe enters the concrete slab. All

conductors shall be routed to a test station.

- d. Valves: Each valve shall be protected with [AM#0002]1 magnesium anode. The magnesium anode shall have an unpackaged weight of [AM#0002]9 pounds.
- e. Metallic Pipe Component or Section: Each section of metallic pipe shall be protected with [AM#0002]2 magnesium anodes. The magnesium anodes shall have an unpackaged weight of [AM#0002]9 pounds.
- f. Connectors or Change-of-Direction Devices: Each change-of-direction device shall be protected with [AM#0002]2 magnesium anodes. The magnesium anode shall have an unpackaged weight of [AM#0002]9 pounds.

1.3.13 Metallic Component Coating

Coatings for metallic components shall be as required for metallic fittings as indicated. This will include fire hydrants, T's, elbows, valves, etc. Coatings shall be selected, applied, and inspected in accordance with NACE RP0190 and as specified in these specifications.

PART 2 PRODUCTS

2.1 MAGNESIUM ANODES

A minimum of [AM#0002]2 anodes shall be installed on the [AM#0002]Pipe system. See Paragraph METALLIC COMPONENTS AND TYPICALS for additional anodes under slab.

2.1.1 Anode Composition

Anodes shall be of high-potential magnesium alloy, made of primary magnesium obtained from sea water or brine, and not made from scrap metal. Magnesium anodes shall conform to ASTM B 843 and to the following analysis (in percents) otherwise indicated:

Aluminum, max.	0.010
Manganese, max.	0.50 to 1.30
Zinc	0.05
Silicon, max.	0.05
Copper, max.	0.02
Nickel, max.	0.001
Iron, Max.	0.03
Other impurities, max.	0.05 each or 0.3 max. total
Magnesium	Remainder

The Contractor shall furnish spectrographic analysis on samples from each heat or batch of anodes used on this project.

2.1.2 Dimensions and Weights

Dimensions and weights of anodes shall be approximately as follows:

TYPICAL MAGNESIUM ANODE SIZE

(Cross sections may be round, square, or D shaped)

NOMINAL WT. LBS.	APPROX. SIZE (IN)	NOMINAL GROSS WT lb PACKAGED IN BACKFILL	NOMINAL PACKAGE DIMENSIONS (IN)
3	3 X 3 X 5	8	5-1/4 X 5-1/4 X 8
5	3 X 3 X 8	13	5-1/4 X 5-1/4 X 11-1/4
9	3 X 3 X 14	27	5-1/4 X 20
12	4 X 4 X 12	32	7-1/2 X 18
17	4 X 4 X 17	45	7-1/2 X 24
32	5 X 5 X 20-1/2	68	8-1/2 X 28
50	7 X 7 X 16	100	10 X 24

2.1.3 Packaged Anodes

Anodes shall be provided in packaged form with the anode surrounded by specially-prepared quick-wetting backfill and contained in a water permeable cloth or paper sack. Anodes shall be centered by means of spacers in the backfill material. The backfill material shall have the following composition, unless otherwise indicated:

Material	Approximate Percent by Weight
Gypsum	75
Bentonite	20
Sodium Sulphate	5
Total	100

2.1.4 Zinc Anodes

Zinc anodes shall conform to ASTM B 418, Type II.

2.1.5 Connecting Wire

2.1.5.1 Wire Requirements

Wire shall be No. [AM#0002]12 AWG solid copper wire, not less than 10 feet long, unspliced, complying with NFPA 70, Type [AM#0002]TW insulation. [AM#0002]Connecting wires for magnesium anodes shall be factory installed with the place or emergence from the anode in a cavity sealed flush with a dielectric sealing compound.

2.1.5.2 Anode Header Cable

Cable for anode header and distribution shall be No. [AM#0002]12 AWG stranded copper wire with type CP high molecular weight polyethylene, 7/64 inch thick insulation, 600-volt rating, in accordance with NEMA WC 5.

2.2 MISCELLANEOUS MATERIALS

2.2.1 Electrical Wire

Wire shall be No. [AM#0002]12 AWG stranded copper wire with NFPA 70, Type [AM#0002]TW insulation. Polyethylene insulation shall comply with the

requirements of ASTM D 1248 and shall be of the following types, classes, and grades:

High-molecular weight polyethylene shall be Type I, Class C, Grade E5.

High-density polyethylene shall be Type III, Class C, Grade E3.

2.2.1.1 Wire Splicing

Connecting wire splicing shall be made with copper compression connectors or exothermic welds, following instructions of the manufacturer. Single split-bolt connections shall not be used. Sheaths for encapsulating electrical wire splices to be buried underground shall fit the insulated wires entering the spliced joints and epoxy potting compound shall be as specified below.

2.2.1.2 Test Wires

Test wires shall be AWG No. 12 stranded copper wire with NFPA 70, Type TW or RHW or polyethylene insulation.

2.2.1.3 Resistance Wire

Resistance wire shall be AWG No. 16 or No. 22 nickel-chromium wire.

2.2.2 Conduit

Rigid galvanized steel conduit and accessories shall conform to UL 6. Non metallic conduit shall conform to NEMA TC 2.

2.2.3 Test Boxes and Junctions Boxes

Boxes shall be outdoor type conforming to UL 514A.

2.2.4 Joint, Patch, Seal, and Repair Coating

Sealing and dielectric compound shall be a black, rubber based compound that is soft, permanently pliable, tacky, moldable, and unbacked. Compound shall be applied as recommended by the manufacturer, but not less than 1/2-inch thick. Coating compound shall be [AM#0002]cold-applied coal-tar base mastic. Pressure-sensitive vinyl plastic electrical tape shall conform to UL 510.

2.2.5 Backfill Shields

Shields shall consist of approved pipeline wrapping or fiberglass-reinforced, coal-tar impregnated tape, or plastic weld caps, specifically made for the purpose and installed in accordance with the manufacturer's recommendations. When joint bonds are required, due to the use of mechanical joints, the entire joint shall be protected by the use of a kraft paper joint cover. The joint cover shall be filled with poured-in, hot coat-tar enamel.

2.2.6 Epoxy Potting Compound

Compound for encapsulating electrical wire splices to be buried underground shall be a two package system made for the purpose.

2.2.7 Test Stations

Stations shall be of the [AM#0002]flush-curb-box type and shall be the standard product of a recognized manufacturer. Test stations shall be complete with an insulated terminal block having the required number of terminals. The test station shall be provided with a lockable over and shall have an embossed legend, "C.P. Test." A minimum of one (1) test station shall be provided each component of the [AM#0002]pipe. A minimum of six (6) terminals shall be provided in each test station. A minimum of two (2) leads are required to the metallic pipe from each test station. Other conductors shall be provided for each anode, other foreign pipe, and reference cells as required. [AM#0002]Test stations may be constructed of nonmetallic materials. However, if nonmetallic materials are utilized, as a minimum, the materials shall be resistant to damage from ultraviolet radiation, contain good color retention qualities, contain high strength qualities, and be resistant to accidental or vandalistic impacts that might be normally encountered in the environment for which they are to be installed. The test stations shall be listed for the particular application for which they are to be utilized.

2.2.8 Joint and Continuity Bonds

Bonds shall be provided across all joints in the metallic [AM#0002]water and gas lines, across any electrically discontinuous connections and all other pipes and structures with other than welded or threaded joints that are included in this cathodic protection system. Unless otherwise specified in the specifications, bonds between structures and across joints in pipe with other than welded or threaded joints shall be No. 8 AWG stranded copper cable with polyethylene insulation. Bonds between structures shall contain sufficient slack for any anticipated movement between structures. Bonds across pipe joints shall contain a minimum of 4 inches of slack to allow for pipe movement and soil stress. Bonds shall be attached by exothermic welding. Exothermic weld areas shall be insulated with coating compound and approved, and witnessed by the Contracting Officer. Continuity bonds shall be installed as necessary to reduce stray current interference. Additional joint bondings shall be accomplished by the Contractor where the necessity is discovered during construction or testing or where the Contracting Officer's representative directs that such bonding be done. Joint bonding shall include all associated excavation and backfilling. There shall be a minimum of two (2) continuity bonds between each structure and other than welded or threaded joints. The Contractor shall test for electrical continuity across all joints with other than welded or threaded joints and across all metallic portions or components. The Contractor shall provide bonding as required and as specified above until electrical continuity is achieved. Bonding test data shall be submitted for approval.

2.2.9 Resistance Bonds

Resistance bonds should be adjusted as outlined in this specification. Alternate methods may be used if they are approved by the Contracting Officer.

2.2.10 Stray Current Measurements

Stray current measurements should be performed at each test station. Stray currents resulting from lightning or overhead alternating current (AC) power transmission systems shall be mitigated in accordance with NACE RP0177.

2.2.11 Electrical Isolation of Structures

As a minimum, isolating flanges or unions shall be provided at the following locations:

- a. Connection of new metallic piping or components to existing piping.
- b. Pressure piping under floor slab to a building.

Isolation shall be provided at metallic connection of all lines to existing system and where connecting to a building. Additionally, isolation shall be provided between [AM#0002]water and/or gas line; and foreign pipes that cross the new lines within 10 feet. Isolation fittings, including isolating flanges and couplings, shall be installed aboveground or in a concrete pit.

2.2.11.1 Electrically Isolating Pipe Joints

Electrically isolating pipe joints shall be of a type that is in regular factory production.

2.2.11.2 Electrically Conductive Couplings

Electrically conductive couplings shall be of a type that has a published maximum electrical resistance rating given in the manufacturer's literature. Cradles and seals shall be of a type that is in regular factory production made for the purpose of electrically insulating the carrier pipe from the casing and preventing the incursion of water into the annular space.

2.2.11.3 Insulating Joint Testing

A Model 601 Insulation Checker, as manufactured by [AM#0002]"Gas Electronics", or an approved equal, shall be used for insulating joint (flange) electrical testing.

2.2.12 Underground Structure Coating

This coating specification shall take precedence over any other project specification and drawing notes, whether stated or implied, and shall also apply to the pipeline or tank supplier. No variance in coating quality shall be allowed by the Contractor or Base Construction Representative without the written consent of the designer. All underground metallic pipelines and tanks to be cathodically protected shall be afforded a good quality factory-applied coating. This includes all carbon steel, cast-iron and ductile-iron pipelines or vessels. Coatings shall be selected, applied, and inspected in accordance with NACE RP0190 and as specified. If non-metallic pipelines are installed, all metallic fittings on pipe sections shall be coated in accordance with this specification section.

- a. The nominal thickness of the metallic pipe joint or other component coating shall be [AM#0002]8 mils, plus or minus 5 percent.
- b. Pipe and joint coating for factory applied or field repair material shall be applied as recommended by the manufacturer and shall be one of the following:
 - (1) Continuously extruded polyethylene and adhesive coating system.
 - (2) Polyvinyl chloride pressure-sensitive adhesive tape.

- (3) High density polyethylene/bituminous rubber compound tape.
- (4) Butyl rubber tape.
- (5) Coal tar epoxy.

2.2.12.1 Field Joints

All field joints shall be coated with materials compatible with the pipeline coating compound. The joint coating material shall be applied to an equal thickness as the pipeline coating. Unbonded coatings shall not be used on these buried metallic components. This includes the elimination of all unbonded polymer wraps or tubes. Once the pipeline or vessel is set in the trench, an inspection of the coating shall be conducted. This inspection shall include electrical holiday detection. Any damaged areas of the coating shall be properly repaired. The Contracting Officer shall be asked to witness inspection of the coating and testing using a holiday detector.

2.2.12.2 Inspection of Pipe Coatings

Any damage to the protective covering during transit and handling shall be repaired before installation. After field coating and wrapping has been applied, the entire pipe shall be inspected by an electric holiday detector with impressed current in accordance with NACE RP0188 using a full-ring, spring-type coil electrode. The holiday detector shall be equipped with a bell, buzzer, or other type of audible signal which sounds when a holiday is detected. All holidays in the protective covering shall be repaired immediately upon detection. Occasional checks of holiday detector potential will be made by the Contracting Officer's representative to determine suitability of the detector. All labor, materials, and equipment necessary for conducting the inspection shall be furnished by the Contractor.

- a. Protective covering for aboveground piping system: Finish painting shall conform to the applicable paragraph of SECTION: 09900, PAINTING, GENERAL, and as follows:
- b. Ferrous surfaces: Shop-primed surfaces shall be touched-up with ferrous metal primer. Surfaces that have not been shop-primed shall be solvent-cleaned. Surfaces that contain loose rust, loose mil scale, and other foreign substances shall be mechanically-cleaned by power wire-brushing and primed with ferrous metal primer. Primed surface shall be finished with two (2) coats of exterior oil paint and vinyl paint. Coating for each entire piping service shall be an approved pipe line wrapping having a minimum coating resistance of 50,000 Ohms per square foot.

2.2.13 Resistance Wire

Wire shall be No. 16 or No. 22 nickel-chromium wire with TW insulation.

2.2.14 Electrical Connections

Electrical connections shall be done as follows:

- a. Exothermic welds shall be [AM#0002]"Cadweld", "Bundy", "Thermoweld" or an approved equal. Use of this material shall be in strict accordance with the manufacturer's recommendations.
- b. Electrical-shielded arc welds shall be approved for use on steel

pipe by shop drawing submittal action.

c. Brazing shall be as specified in Paragraph: Lead Wire Connections.

2.2.15 Electrical Tape

Pressure-sensitive vinyl plastic electrical tape shall conform to UL 510.

2.2.16 Permanent Reference Electrodes

Permanent reference electrodes shall be Cu-CuSO₄ electrodes suitable for direct burial. Electrodes shall be guaranteed by the supplier for 15 years' service in the environment in which they shall be placed. Electrodes shall be installed directly beneath pipe, or metallic component.

2.2.17 Casing

Where a pipeline is installed in a casing under a roadway or railway, the pipeline shall be electrically insulated from the casing, and the annular space sealed and filled with an approved corrosion inhibiting product against incursion of water.

PART 3 EXECUTION

3.1 CRITERIA OF PROTECTION

Acceptance criteria for determining the adequacy of protection on a buried underground [AM#0002]pipe and metallic component shall be in accordance with [AM#0002]NACE RP0169 and as specified below.

3.1.1 Iron and Steel

The following method (a) shall be used for testing cathodic protection voltages. If more than one method is required, method (b) shall be used.

- a. A negative voltage of at least minus 850 millivolts as measured between the underground component and a saturated copper-copper sulphate reference electrode connecting the earth (electrolyte) directly over the underground component. Determination of this voltage shall be made with the cathodic protection system in operation. Voltage drops shall be considered for valid interpretation of this voltage measurement. A minimum of minus 850 millivolts "instant off" potential between the underground component being tested and the reference cell shall be achieved over 95 percent of the area of the structure. Adequate number of measurements shall be obtained over the entire structure, pipe, tank, or other metallic component to verify and record achievement of minus 850 millivolts "instant off." This potential shall be obtained over 95 percent of the total metallic area without the "instant off" potential exceeding 1200 millivolts.
- b. A minimum polarization voltage shift of 100 millivolts as measured between the underground component and a saturated copper-copper sulphate reference electrode contacting the earth directly over the underground component. This polarization voltage shift shall be determined by interrupting the protective current and measuring the polarization decay. When the protective current is interrupted, an immediate voltage shift will occur. The voltage reading, after the immediate shift, shall be used as the base

reading from which to measure polarization decay. Measurements achieving 100 millivolts decay shall be made over 95 percent of the metallic surface being protected.

- c. For any metallic component, a minimum of four (4) measurements shall be made using subparagraph (a), above, and achieving the "instant off" potential of minus 850 millivolts. Two (2) measurements shall be made over the anodes and two (2) measurements shall be made at different locations near the component and farthest away from the anode.

3.1.2 Aluminum

Aluminum underground component shall not be protected to a potential more negative than minus 1200 millivolts, measured between the underground component and a saturated copper-copper sulphate reference electrode contacting the earth, directly over the metallic component. Resistance, if required, shall be inserted in the anode circuit within the test station to reduce the potential of the aluminum to a value which will not exceed a potential more negative than minus 1200 millivolts. Voltage shift criterion shall be a minimum negative polarization shift of 100 millivolts measured between the metallic component and a saturated copper-copper sulphate reference electrode contacting the earth, directly over the metallic component. The polarization voltage shift shall be determined as outlined for iron and steel.

3.1.3 Copper Piping

For copper piping, the following criteria shall apply: A minimum of 100 millivolts of cathodic polarization between the structure surface and a stable reference electrode contacting the electrolyte. The polarization voltage shift shall be determined as outlined for iron and steel.

3.2 ANODE STORAGE AND INSTALLATION

3.2.1 Anode Storage

Storage area for magnesium anodes will be designated by the Contracting Officer. If anodes are not stored in a building, tarps or similar protection should be used to protect anodes from inclement weather. Packaged anodes, damaged as a result of improper handling or being exposed to rain, shall be resacked by the Contractor and the required backfill added.

3.2.2 Anode Installation

Unless otherwise authorized, installation shall not proceed without the presence of the Contracting Officer. Anodes of the size specified shall be installed to the depth indicated and at the locations shown. Locations may be changed to clear obstructions with the approval of the Contracting Officer. Anodes shall be installed in sufficient number and of the required type, size, and spacing to obtain a uniform current distribution over the surface of the structure. The anode system shall be designed for a life of 25 years of continuous operation. Anodes shall be installed as indicated in a dry condition after any plastic or waterproof protective covering has been completely removed from the water permeable, permanent container housing the anode metal. The anode connecting wire shall not be used for lowering the anode into the hole. The annular space around the anode shall be backfilled with fine earth in 6 inch layers and each layer

shall be hand tamped. Care must be exercised not to strike the anode or connecting wire with the tamper. Approximately 5 gallons of water shall be applied to each filled hole after anode backfilling and tamping has been completed to a point about 6 inches above the anode. After the water has been absorbed by the earth, backfilling shall be completed to the ground surface level.

3.2.2.1 Single Anodes

Single anodes, spaced as shown, shall be connected to the pipeline, allowing adequate slack in the connecting wire to compensate for movement during backfill operation.

3.2.2.2 Groups of Anodes

Groups of anodes, in quantity and location shown, shall be connected to an anode header cable. The anode header cable shall make contact with the structure to be protected only through a test station. Anode lead connection to the anode header cable shall be made by an approved crimp connector or exothermic weld and splice mold kit with appropriate potting compound.

3.2.2.3 Welding Methods

Connections to ferrous pipe shall be made by exothermic weld methods manufactured for the type of pipe supplied. Electric arc welded connections and other types of welded connections to ferrous pipe and structures shall be approved before use.

3.2.3 Anode Placement - General

Packaged anodes shall be installed completely dry, and shall be lowered into holes by rope sling or by grasping the cloth gather. The anode lead wire shall not be used in lowering the anodes. The hole shall be backfilled with fine soil in 6 inch layers and each layer shall be hand-tamped around the anode. Care must be exercised not to strike the anode or lead wire with the tamper. If immediate testing is to be performed, water shall be added only after backfilling and tamping has been completed to a point 6 inches above the anode. Approximately 2 gallons of water may be poured into the hole. After the water has been absorbed by the soil, backfilling and tamping may be completed to the top of the hole. Anodes shall be installed as specified or shown. In the event a rock strata is encountered prior to achieving specified augered-hole depth, anodes may be installed horizontally to a depth at least as deep as the bottom of the pipe, with the approval of the Contracting Officer.

3.2.4 Underground Pipeline

Anodes shall be installed at a minimum of 8 feet and a maximum of 10 feet from the line to be protected.

3.2.5 Installation Details

Details shall conform to the requirements of this specification. Details shown on the drawings are indicative of the general type of material required, and are not intended to restrict selection to material of any particular manufacturer.

3.2.6 Lead Wire Connections

3.2.6.1 Underground Pipeline (Metallic)

To facilitate periodic electrical measurements during the life of the sacrificial anode system and to reduce the output current of the anodes, if required, all anode lead wires shall be connected to a test station and buried a minimum of 24 inches in depth. The cable shall be No. 10 AWG, stranded copper, polyethylene or RHW-USE insulated cable. The cable shall make contact with the structure only through a test station. Resistance wire shall be installed between the cable and the pipe cable, in the test station, to reduce the current output, if required. Anode connections, except in the test station, shall be made with exothermic welding process, and shall be insulated by means of at least three (3) layers of electrical tape; and all lead wire connections shall be installed in a moistureproof splice mold kit and filled with epoxy resin. Lead wire-to-structure connections shall be accomplished by an exothermic welding process. All welds shall be in accordance with the manufacturer's recommendations. A backfill shield filled with a pipeline mastic sealant or material compatible with the coating shall be placed over the weld connection and shall be of such diameter as to cover the exposed metal adequately.

3.2.6.2 Resistance Wire Splices

Resistance wire connections shall be accomplished with silver solder and the solder joints wrapped with a minimum of three (3) layers of pressure-sensitive tape. Lead wire connections shall be installed in a moistureproof splice mold kit and filled with epoxy resin.

3.2.7 Location of Test Stations

Test stations shall be of the type and location shown and shall be [AM#0002] curb box mounted. Buried insulating joints shall be provided with test wire connections brought to a test station. Unless otherwise shown, other test stations shall be located as follows:

- a. At 1,000-foot intervals or less.
- b. Where the pipe or conduit crosses any other metal pipe.
- c. At both ends of casings under roadways and railways.
- d. Where both sides of an insulating joint are not accessible above ground for testing purposes.

3.2.8 Underground Pipe Joint Bonds

Underground pipe having other than welded or threaded coupling joints shall be made electrically continuous by means of a bonding connection installed across the joint.

3.3 ELECTRICAL ISOLATION OF STRUCTURES

3.3.1 Isolation Joints and Fittings

Isolating fittings, including main line isolating flanges and couplings, shall be installed aboveground, or within manholes, wherever possible. Where isolating joints must be covered with soil, they shall be fitted with a paper joint cover specifically manufactured for covering the particular

joint, and the space within the cover filled with hot coal-tar enamel. Isolating fittings in lines entering buildings shall be located at least 12 inches above grade of floor level, when possible. Isolating joints shall be provided with grounding cells to protect against over-voltage surges or approved surge protection devices. The cells shall provide a low resistance across isolating joint without excessive loss of cathodic current.

3.3.2 Gas Distribution Piping

Electrical isolation shall be provided at each building riser pipe to the pressure regulator, at all points where a short to another structure or to a foreign structure may occur, and at other locations as indicated on the drawings.

3.4 TRENCHING AND BACKFILLING

Trenching and backfilling shall be in accordance with [AM#0002]Section 02316A EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS.

3.5 TESTS AND MEASUREMENTS

3.5.1 Baseline Potentials

Each test and measurement will be witnessed by the Contracting Officer. The Contractor shall notify the Contracting Officer a minimum of five (5) working days prior to each test. After backfill of the [AM#0002]pipe, the static potential-to-soil of the [AM#0002]pipe shall be measured. The locations of these measurements shall be identical to the locations specified for [AM#0002]pipe-to-reference electrode potential measurements. The initial measurements shall be recorded.

3.5.2 Isolation Testing

Before the anode system is connected to the [AM#0002]pipe, an isolation test shall be made at each isolating joint or fitting. This test shall demonstrate that no metallic contact, or short circuit exists between the two isolated sections of the [AM#0002]pipe. Any isolating fittings installed and found to be defective shall be reported to the Contracting Officer.

3.5.2.1 Insulation Checker

A Model 601 insulation checker, as manufactured by [AM#0002]"Gas Electronics", or an approved equal, using the continuity check circuit, shall be used for isolating joint (flange) electrical testing. Testing shall conform to the manufacturer's operating instructions. Test shall be witnessed by the Contracting Officer. An isolating joint that is good will read full scale on the meter. If an isolating joint is shorted, the meter pointer will be deflected or near zero on the meter scale. Location of the fault shall be determined from the instructions, and the joint shall be repaired. If an isolating joint is located inside a vault, the pipe shall be sleeved with insulator when entering and leaving the vault.

3.5.2.2 Cathodic Protection Meter

A Model B3A2 cathodic protection meter, as manufactured by [AM#0002]"M.C. Miller", or an approved equal, using the continuity check circuit, shall be used for isolating joint (flange) electrical testing. This test shall be

performed in addition to the Model 601 insulation checker. Continuity is checked across the isolation joint after the test lead wire is shorted together and the meter adjusted to scale. A full-scale deflection indicates the system is shorted at some location. The Model 601 verifies that the particular insulation under test is good and the Model B3A2 verifies that the system is isolated. If the system is shorted, further testing shall be performed to isolate the location of the short.

3.5.3 Anode Output

As the anodes or groups of anodes are connected to the [AM#0002]pipe, current output shall be measured with an approved clamp-on milliammeter, calibrated shunt with a suitable millivoltmeter or multimeter, or a low resistance ammeter. (Of the three methods, the low-resistance ammeter is the least desirable and most inaccurate. The clamp-on milliammeter is the most accurate.) The valves obtained and the date, time, and location shall be recorded.

3.5.4 Reference Electrode Potential Measurements

Upon completion of the installation and with the entire cathodic protection system in operation, electrode potential measurements shall be made using a copper-copper sulphate reference electrode and a potentiometer-voltmeter, or a direct-current voltmeter having an internal resistance (sensitivity) of not less than 10 megohms per volt and a full scale of 10 volts. The locations of these measurements shall be identical to the locations used for baseline potentials. The values obtained and the date, time, and locations of measurements shall be recorded. No less than eight (8) measurements shall be made over any length of line or component. Additional measurements shall be made at each distribution service riser, with the reference electrode placed directly over the service line.

3.5.5 Location of Measurements

3.5.5.1 Piping or Conduit

For coated piping or conduit, measurements shall be taken from the reference electrode located in contact with the earth, directly over the pipe. Connection to the pipe shall be made at service risers, valves, test leads, or by other means suitable for test purposes. Pipe-to-soil potential measurements shall be made at intervals not exceeding [AM#0002]5 feet. The Contractor may use a continuous pipe-to-soil potential profile in lieu of 5 foot interval pipe-to-soil potential measurements. Additional measurements shall be made at each distribution service riser, with the reference electrode placed directly over the service line adjacent to the riser. Potentials shall be plotted versus distance to an approved scale. Locations where potentials do not meet or exceed the criteria shall be identified and reported to the Contracting Officer's representative.

3.5.5.2 Casing Tests

Before final acceptance of the installation, the electrical separation of carrier pipe from casings shall be tested and any short circuits corrected.

3.5.5.3 Interference Testing

Before final acceptance of the installation, interference tests shall be made with respect to any foreign [AM#0002]pipes in cooperation with the owner of the foreign [AM#0002]pipes. A full report of the tests giving all

details shall be made. Stray current measurements shall be performed at all isolating locations and at locations where the new pipeline crosses foreign metallic pipes. The method of measurements and locations of measurements shall be submitted for approval. As a minimum, stray current measurements shall be performed at the following locations:

- a. Connection point of new pipeline to existing pipeline.
- b. Crossing points of new pipeline with existing lines.

Results of stray current measurements shall also be submitted for approval.

3.5.5.4 Holiday Test

Any damage to the protective covering during transit and handling shall be repaired before installation. After field-coating and wrapping has been applied, the entire pipe shall be inspected by an electric holiday detector with impressed current in accordance with NACE RP0188 using a full-ring, spring-type coil electrode. The holiday detector shall be equipped with a bell, buzzer, or other type of audible signal which sounds when a holiday is detected. Holidays in the protective covering shall be repaired upon detection. Occasional checks of holiday detector potential will be made by the Contracting Officer to determine suitability of the detector. Labor, materials, and equipment necessary for conducting the inspection shall be furnished by the Contractor. The coating system shall be inspected for holes, voids, cracks, and other damage during installation.

3.5.5.5 Recording Measurements

All [AM#0002]pipe-to-soil potential measurements, including initial potentials where required, shall be recorded. The Contractor shall locate, correct and report to the Contracting Officer any short circuits to foreign [AM#0002]pipes encountered during checkout of the installed cathodic protection system. [AM#0002]Pipe-to-soil potential measurements shall be taken on as many pipes as necessary to determine the extent of protection or to locate short-circuits.

3.6 TRAINING COURSE

The Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total of [AM#0002]4 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. The field instructions shall cover all of the items contained in the operating and maintenance instructions, as well as demonstrations of routine maintenance operations, including testing procedures included in the maintenance instructions. At least 14 days prior to date of proposed conduction of the training course, the training course curriculum shall be submitted for approval, along with the proposed training date. Training shall consist of demonstration of test equipment, providing forms for test data and the tolerances which indicate that the system works.

3.7 CLEANUP

The Contractor shall be responsible for cleanup of the construction site. All paper bags, wire clippings, etc., shall be disposed of as directed. Paper bags, wire clippings and other waste shall not be put in bell holes or anodes excavation.

3.8 MISCELLANEOUS INSTALLATION AND TESTING

3.8.1 Coatings

All aboveground pipeline shall be coated as indicated or as approved. The coating shall have a minimum thickness of 7 mil. The pipeline coating shall be in accordance with all applicable Federal, State, and local regulations.

3.8.2 Excavation

In the event rock is encountered in providing the required depth for anodes, the Contractor shall determine an alternate approved location and, if the depth is still not provided, an alternate plan shall be submitted to the Contracting Officer. Alternate techniques and depths must be approved prior to implementation.

3.9 SPARE PARTS

After approval of shop drawings, and not later than three (3) months prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of material and equipment specified. The data shall include a complete list of parts, special tools, and supplies, with current unit prices and source of supply. In addition, the Contractor shall supply information for material and equipment replacement for all other components of the complete system, including anodes, cables, splice kits and connectors, corrosion test stations, and any other components not listed above.

3.10 SEEDING

Seeding shall be done by the Contractor, as directed, in all unsurfaced locations disturbed by this construction. In areas where grass cover exists, it is possible that sod can be carefully removed, watered, and stored during construction operations, and replaced after the operations are completed since it is estimated that no section of pipeline should remain uncovered for more than two (2) days. The use of sod in lieu of seeding shall require approval by the Contracting Officer.

3.11 SYSTEM TESTING

The Contractor shall submit a report including potential measurements taken at adequately-close intervals to establish that minus 850 millivolts potential, "instant-off" potential, is provided, and that the cathodic protection is not providing interference to other foreign pipes causing damage to paint or pipes. The report shall provide a narrative describing how the criteria of protection is achieved without damaging other pipe or structures in the area.

3.12 CLEARING OF TREES AND UNDERBRUSH

In the areas of the anode beds, all trees and underbrush shall be cleared and grubbed to the limits shown or indicated.

-- End of Section --

SECTION 15400A

PLUMBING, GENERAL PURPOSE

08/02

Amendment No. 0002

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

- | | |
|----------|---|
| ARI 1010 | (1994) Self-Contained, Mechanically Refrigerated Drinking-Water Coolers |
| ARI 700 | (1999) Specifications for Fluorocarbon and Other Refrigerants |

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|-------------|---|
| ANSI Z21.22 | (1999) Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems |
| ANSI A117.1 | (1998) ICC/ANSI A117.1 (Guidelines for Access Usable Buildings and Facilities) |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|-----------------|---|
| ASTM A 53/A 53M | (2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A 733 | (2001) Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples |
| ASTM A 74 | (1998) Cast Iron Soil Pipe and Fittings |
| ASTM A 888 | (1998el) Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications |
| ASTM B 32 | (2000) Solder Metal |
| ASTM B 370 | (1998) Copper Sheet and Strip for Building Construction |
| ASTM B 43 | (1998) Seamless Red Brass Pipe, Standard Sizes |
| ASTM B 813 | (2000) Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube |

ASTM B 88	(1999e1) Seamless Copper Water Tube
ASTM C 564	(1997) Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2665	(2000) Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D 2822	(1991; R 1997e1) Asphalt Roof Cement
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3308	(2001) PTFE Resin Skived Tape
ASTM D 3311	(1994) Drain, Waste, and Vent (DWV) Plastic Fittings Patterns
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 34	(2001; Errata 2002) Number Designation and Safety Classification of Refrigerants
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AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1002	(1999) Anti-siphon Fill Valves (Ballcocks) for Water Closet Flush Tanks
ASSE 1003	(2001) Water Pressure Reducing Valves
ASSE 1005	(1999) Water Heater Drain Valves
ASSE 1018	(2001) Trap Seal Primer Valves, Water Supply Fed

[AM#0002]ASSE 1037

(1990; Rev thru Mar 1990) Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA B301	(1999) Liquid Chlorine
AWWA C700	(1995) Cold-Water Meters - Displacement Type, Bronze Main Case

AWWA C707 (1982; R 1992) Encoder-Type
Remote-Registration Systems for Cold-Water
Meters

AWWA EWW (1998) Standard Methods for the
Examination of Water and Wastewater

AWWA M20 (1973) Manual: Water Chlorination
Principles and Practices

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8 (1992) Filler Metals for Brazing and Braze
Welding

AWS B2.2 (1991) Brazing Procedure and Performance
Qualification

ASME INTERNATIONAL (ASME)

ASME A112.19.1M (1994; R 1999 Enameled Cast Iron Plumbing
Fixtures

ASME A112.19.2M (1998) Vitreous China Plumbing Fixtures

ASME A112.19.3M (2001) Stainless Steel Fixtures (Designed
for Residential Use)

ASME A112.21.1M (1991; R 1998) Floor Drains

ASME A112.36.2M (1991; R 1998) Cleanouts

ASME B1.20.1 (1983; R 2001) Pipe Threads, General
Purpose, Inch

ASME B16.12 (1998) Cast Iron Threaded Drainage Fittings

ASME B16.15 (1985; R 1994) Cast Bronze Threaded
Fittings Classes 125 and 250

ASME B16.22 (1995) Wrought Copper and Copper Alloy
Solder Joint Pressure Fittings

ASME B16.3 (1998) Malleable Iron Threaded Fittings

ASME B31.5 (2001) Refrigeration Piping and Heat
Transfer Components

ASME B40.1 (1991) Gauges - Pressure Indicating Dial
Type - Elastic Element

CAST IRON SOIL PIPE INSTITUTE (CISPI)

CISPI 301 (2000) Hubless Cast Iron Soil Pipe and
Fittings for Sanitary and Storm Drain,
Waste, and Vent Piping Applications

CISPI 310 (1997) Coupling for Use in Connection with

Hubless Cast Iron Soil Pipe and Fittings
for Sanitary and Storm Drain, Waste, and
Vent Piping Applications

CISPI HSN-85 (1985) Neoprene Rubber Gaskets for Hub and
Spigot Cast Iron Soil Pipe and Fittings

COPPER DEVELOPMENT ASSOCIATION (CDA)

CDA Tube A 4015 (1994; R 1995) Copper Tube Handbook

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
(IAPMO)

IAPMO Z124.5 (1997) Plastic Toilet (Water Closets) Seats

INTERNATIONAL CODE COUNCIL (ICC)

CABO A117.1 (1998) Accessible and Usable Buildings and
Facilities

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
INDUSTRY (MSS)

MSS SP-110 (1996) Ball Valves Threaded,
Socket-Welding, Solder Joint, Grooved and
Flared Ends

MSS SP-58 (1993) Pipe Hangers and Supports -
Materials, Design and Manufacture

MSS SP-69 (1996) Pipe Hangers and Supports -
Selection and Application

MSS SP-73 (1991; R 1996) Brazing Joints for Copper
and Copper Alloy Pressure Fittings

MSS SP-80 (1997) Bronze Gate, Globe, Angle and Check
Valves

NSF INTERNATIONAL (NSF)

NSF 61 (1999;2001 Addendum 1 - Sep 2001) Drinking
Water System Components - Health Effects

PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201 (1992) Water Hammer Arresters

PLUMBING-HEATING-COOLING CONTRACTORS NATIONAL ASSOCIATION (PHCC)

NAPHCC Plumbing Code (2000) National Standard Plumbing Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 430 Energy Conservation Program for Consumer
Products

PL 93-523 (1974; Amended 1986) Safe Drinking Water

Act

UNDERWRITERS LABORATORIES (UL)

UL 174 (1996; Rev thru Oct 1999) Household
Electric Storage Tank Water Heaters

1.2 STANDARD PRODUCTS

Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening.

1.3 ELECTRICAL WORK

Motors, motor controllers and motor efficiencies shall conform to the requirements of Section 16415A ELECTRICAL WORK, INTERIOR. Electrical motor-driven equipment specified herein shall be provided complete with motors. Equipment shall be rated at 60 Hz, single phase, ac unless otherwise indicated. Where a motor controller is not provided in a motor-control center on the electrical drawings, a motor controller shall be as indicated. Motor controllers shall be provided complete with properly sized thermal-overload protection in each ungrounded conductor, auxiliary contact, and other equipment, at the specified capacity, and including an allowable service factor.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plumbing Fixture Schedule; .

Catalog cuts of specified plumbing fixtures, valves, and related piping system and system location where installed.

Plumbing System; .

Diagrams, instructions, and other sheets proposed for posting. Manufacturer's recommendations for the installation of solvent welded joints for PVC pipe and solder joints for copper tubing.

SD-06 Test Reports

Tests, Flushing and Disinfection; G.

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, completion and testing of the installed system. Each test report shall indicate the final position of controls.

1.5 PERFORMANCE REQUIREMENTS

[AM#0002]1.5.1 Cathodic Protection and Pipe Joint Bending

Cathodic protection and pipe joint bonding systems shall be in accordance with Section 13110A CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE).

1.6 REGULATORY REQUIREMENTS

Plumbing work shall be in accordance with ICC International Plumbing Code.

1.7 PROJECT/SITE CONDITIONS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

PART 2 PRODUCTS

2.1 MATERIALS

Materials for various services shall be in accordance with TABLES I and II.

Pipe schedules shall be selected based on service requirements. Pipe fittings shall be compatible with the applicable pipe materials. Pipe threads (except dry seal) shall conform to ASME B1.20.1. Material or equipment containing lead shall not be used in any potable water system. In line devices such as water meters, building valves, check valves, meter stops, valves, and fittings shall comply with PL 93-523 and NSF 61, Section 8. End point devices such as drinking water fountains, lavatory faucets, kitchen and bar faucets, ice makers, supply stops and end point control valves used to dispense water for drinking must meet the requirements of NSF 61, Section 9. Hubless cast-iron soil pipe shall not be installed underground or under concrete floor slabs.

2.1.1 Pipe Joint Materials

Hubless cast-iron soil pipe shall not be used under ground. Joints and gasket materials shall conform to the following:

- a. Coupling for Cast-Iron Pipe: for hubless type: CISPI 310
- b. Neoprene Gaskets for Hub and Cast-Iron Pipe and Fittings: CISPI HSN-85.
- c. Brazing Material: Brazing material shall conform to AWS A5.8, BCuP-5.
- d. Brazing Flux: Flux shall be in paste or liquid form appropriate for use with brazing material. Flux shall be as follows:
lead-free; have a 100 percent flushable residue; contain slightly acidic reagents; contain potassium borides; and contain fluorides.
- e. Solder Material: Solder metal shall conform to ASTM B 32.
- f. Solder Flux: Flux shall be liquid form, non-corrosive, and conform to ASTM B 813, Standard Test 1.
- g. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe, ASTM D 3308.

- h. Rubber Gaskets for Cast-Iron Soil-Pipe and Fittings (hub and spigot type and hubless type): ASTM C 564.
- i. Flexible Elastomeric Seals: ASTM D 3212 or ASTM F 477.
- j. Plastic Solvent Cement for PVC Plastic Pipe: ASTM D 2564 and ASTM D 2855.
- k. Thread sealant compound: IAMPCO File No. 1282

2.1.2 Miscellaneous Materials

Miscellaneous materials shall conform to the following:

- a. Water Hammer Arrestor: PDI WH 201.
- b. Copper, Sheet and Strip for Building Construction: ASTM B 370.
- c. Asphalt Roof Cement: ASTM D 2822.
- d. Metallic Cleanouts: ASME A112.36.2M.
- e. Plumbing Fixture Setting Compound: A preformed flexible ring seal molded from hydrocarbon wax material. The seal material shall be nonvolatile nonasphaltic and contain germicide and provide watertight, gastight, odorproof and verminproof properties.
- f. Liquid Chlorine: AWWA B301.
- g. Gauges - Pressure and Vacuum Indicating Dial Type - Elastic Element: ASME B40.1.

2.1.3 Pipe Insulation Material

Insulation shall be as specified in Section 15080A THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.2 PIPE HANGERS, INSERTS, AND SUPPORTS

Pipe hangers, inserts, and supports shall conform to MSS SP-58 and MSS SP-69.

2.3 VALVES

Valves shall be provided on supplies to equipment and fixtures. Valves 2-1/2 inches and smaller shall be bronze with threaded bodies for pipe and solder-type connections for tubing. Pressure ratings shall be based upon the application. Valves shall conform to the following standards:

Description	Standard
Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends	MSS SP-110
Bronze Gate, Globe, Angle, and Check Valves	MSS SP-80
Vacuum Relief Valves	ANSI Z21.22
Water Pressure Reducing Valves	ASSE 1003

Description	Standard
Water Heater Drain Valves	ASSE 1005
Trap Seal Primer Valves	ASSE 1018
Temperature and Pressure Relief Valves for Hot Water Supply Systems	ANSI Z21.22

2.3.1 Wall Faucets

Wall faucets with vacuum-breaker backflow preventer shall be brass with 3/4 inch male inlet threads, hexagon shoulder, and 3/4 inch hose connection. Faucet handle shall be securely attached to stem.

2.3.2 Wall Hydrants

Wall hydrants with vacuum-breaker backflow preventer shall have a nickel-brass or nickel-bronze wall plate or flange with nozzle and detachable key handle. A brass or bronze operating rod shall be provided within a galvanized iron casing of sufficient length to extend through the wall so that the valve is inside the building, and the portion of the hydrant between the outlet and valve is self-draining. A brass or bronze valve with coupling and union elbow having metal-to-metal seat shall be provided. Valve rod and seat washer shall be removable through the face of the hydrant. The hydrant shall have 3/4 inch exposed hose thread on spout and 3/4 inch male pipe thread on inlet.

2.3.3 Relief Valves

Water heaters shall have a combination pressure and temperature (P&T) relief valve. The pressure relief element of a P&T relief valve shall have adequate capacity to prevent excessive pressure buildup in the system when the system is operating at the maximum rate of heat input. The temperature element of a P&T relief valve shall have a relieving capacity which is at least equal to the total input of the heaters when operating at their maximum capacity. Relief valves shall be rated according to ANSI Z21.22. Relief valves for systems where the maximum rate of heat input is less than 200,000 Btuh shall have 3/4 inch minimum inlets, and 3/4 inch outlets. The discharge pipe from the relief valve shall be the size of the valve outlet.

2.3.4 Displacement Type Water Meter

Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in U.S. gallons. Meters in sizes 1/2 inch through 1 inch shall be of the frost-protection design. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder-type remote register designed in accordance with AWWA C707. Meters shall include a 4 ft, 3-conductor, 22 AWG output cable and must be compatible with Fort Hood's existing Automatic Meter Reading System (AMRS). Meters shall comply with the accuracy and capacity requirements of AWWA C700.

2.4 FIXTURES

Fixtures shall be water conservation type, in accordance with ICC International Plumbing Code. Fixtures for use by the physically

handicapped shall be in accordance with CABO A117.1. Vitreous china, nonabsorbent, hard-burned, and vitrified throughout the body shall be provided. Porcelain enameled ware shall have specially selected, clear white, acid-resisting enamel coating evenly applied on surfaces. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system, except grease interceptors, shall be equipped with a trap. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Fixtures with the supply discharge below the rim shall be equipped with backflow preventers. Internal parts of flush and/or flushometer valves and pop-up stoppers of lavatory waste drains may contain acetal resin, fluorocarbon, nylon, acrylonitrile-butadiene-styrene (ABS) or other plastic material, if the material has provided satisfactory service under actual commercial or industrial operating conditions for not less than 2 years. Plastic in contact with hot water shall be suitable for 180 degrees F water temperature. All exposed lavatory traps shall be furnished with an ADA approved trap insulation kit. Plumbing fixtures shall be as indicated in paragraph PLUMBING FIXTURE SCHEDULE.

2.4.1 Lavatories

Enameled cast-iron lavatories shall be provided with two cast-iron or steel brackets secured to the underside of the apron and drilled for bolting to the wall in a manner similar to the hanger plate. Exposed brackets shall be porcelain enameled. Vitreous china lavatories shall be provided with two integral molded lugs on the back-underside of the fixture and drilled for bolting to the wall in a manner similar to the hanger plate.

2.4.2 Automatic Flushing System

Flushing system shall consist of solenoid-activated flush valve with electrical-operated light beam sensor to energize solenoid. Flushing devices shall be provided as described in paragraph FIXTURES AND FIXTURE TRIMMINGS.

2.5 DRAINS

2.5.1 Floor Drains

Floor drains shall consist of a galvanized body, integral seepage pan, and adjustable perforated or slotted chromium-plated bronze, nickel-bronze, or nickel-brass strainer, consisting of grate and threaded collar. Floor drains shall be cast iron except where metallic waterproofing membrane is installed. Drains shall be of double drainage pattern for embedding in the floor construction. The seepage pan shall have weep holes or channels for drainage to the drainpipe. The strainer shall be adjustable to floor thickness. A clamping device for attaching flashing or waterproofing membrane to the seepage pan without damaging the flashing or waterproofing membrane shall be provided when required. Drains shall be provided with threaded connection. Between the drain outlet and waste pipe, a neoprene rubber gasket conforming to ASTM C 564 may be installed, provided that the drain is specifically designed for the rubber gasket compression type joint. Floor drains shall conform to ASME A112.21.1M.

2.6 TRAPS

Unless otherwise specified, traps shall be copper-alloy adjustable tube type with slip joint inlet and swivel. Traps shall be without a cleanout. Tubes shall be copper alloy with walls not less than 0.032 inch thick within commercial tolerances, except on the outside of bends where the thickness may be reduced slightly in manufacture by usual commercial methods. Inlets shall have rubber washer and copper alloy nuts for slip joints above the discharge level. Swivel joints shall be below the discharge level and shall be of metal-to-metal or metal-to-plastic type as required for the application. Nuts shall have flats for wrench grip. Outlets shall have internal pipe thread, except that when required for the application, the outlets shall have sockets for solder-joint connections. The depth of the water seal shall be not less than 2 inches. The interior diameter shall be not more than 1/8 inch over or under the nominal size, and interior surfaces shall be reasonably smooth throughout. A copper alloy "P" trap assembly consisting of an adjustable "P" trap and threaded trap wall nipple with cast brass wall flange shall be provided for lavatories. The assembly shall be a standard manufactured unit and may have a rubber-gasketed swivel joint.

2.7 WATER HEATERS

Water heater types and capacities shall be as indicated. Each water heater shall have replaceable anodes. Each water heater shall have controls with an adjustable range that includes 90 to 160 degrees F. The thermal efficiencies and standby heat losses shall conform to TABLE III for each type of water heater specified. A factory pre-charged expansion tank shall be installed on the cold water supply to each water heater where required. Expansion tanks shall be specifically designed for use on potable water systems and shall be rated for 200 degrees F water temperature and 150 psi working pressure. The expansion tank size and acceptance volume shall be as indicated.

2.7.1 Automatic Storage Type

2.7.1.1 Electric Type

Electric type water heaters shall conform to UL 174 with either single or dual heating elements. The elements shall be wired so that only one element can operate at a time. A phenolic resin coating shall be provided.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories. Water and drainage piping shall be extended 5 feet outside the building, unless otherwise indicated. A ball valve and drain shall be installed on the water service line inside the building. Piping shall be connected to the exterior service lines or capped or plugged if the exterior service is not in place. Sewer and water pipes shall be laid in separate trenches, except when otherwise shown. Exterior underground utilities shall be at least 12 inches below the average local frost depth or as indicated on the drawings. If trenches are closed or the pipes are otherwise covered before being connected to the service lines, the location of the end of each plumbing utility shall be marked with a stake or other acceptable means. Valves shall be installed with control no lower than the valve body.

3.1.1 Water Pipe, Fittings, and Connections

3.1.1.1 Utilities

The piping shall be extended to fixtures, outlets, and equipment. The hot-water and cold-water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control valves which are supplied with integral stops, shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with operation of other equipment or fixtures. Supply piping to fixtures, faucets, hydrants, shower heads, and flushing devices shall be anchored to prevent movement.

3.1.1.2 Cutting and Repairing

The work shall be carefully laid out in advance, and unnecessary cutting of construction shall be avoided. Damage to building, piping, wiring, or equipment as a result of cutting shall be repaired by mechanics skilled in the trade involved.

3.1.1.3 Protection of Fixtures, Materials, and Equipment

Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury. Upon completion of the work, the fixtures, materials, and equipment shall be thoroughly cleaned, adjusted, and operated. Safety guards shall be provided for exposed rotating equipment.

3.1.1.4 Mains, Branches, and Runouts

Piping shall be installed as indicated. Pipe shall be accurately cut and worked into place without springing or forcing. Structural portions of the building shall not be weakened. Aboveground piping shall run parallel with the lines of the building, unless otherwise indicated. Branch pipes from service lines may be taken from top, bottom, or side of main, using crossover fittings required by structural or installation conditions. Supply pipes, valves, and fittings shall be kept a sufficient distance from other work and other services to permit not less than 1/2 inch between finished covering on the different services. Bare and insulated water lines shall not bear directly against building structural elements so as to transmit sound to the structure or to prevent flexible movement of the lines. Water pipe shall not be buried in or under floors unless specifically indicated or approved. Changes in pipe sizes shall be made with reducing fittings. Use of bushings will not be permitted except for use in situations in which standard factory fabricated components are furnished to accommodate specific accepted installation practice. Change in direction shall be made with fittings, except that bending of pipe 4 inches and smaller will be permitted, provided a pipe bender is used and wide sweep bends are formed. The center-line radius of bends shall be not less than six diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be acceptable.

3.1.1.5 Pipe Drains

Pipe drains indicated shall consist of 3/4 inch hose bibb with renewable seat and ball valve ahead of hose bibb. At other low points, 3/4 inch brass plugs or caps shall be provided. Disconnection of the supply piping at the fixture is an acceptable drain.

3.1.1.6 Expansion and Contraction of Piping

Allowance shall be made throughout for expansion and contraction of water pipe. Each hot-water and hot-water circulation riser shall have expansion loops or other provisions such as offsets, changes in direction, etc., where indicated and/or required. Risers shall be securely anchored as required or where indicated to force expansion to loops. Branch connections from risers shall be made with ample swing or offset to avoid undue strain on fittings or short pipe lengths. Horizontal runs of pipe over 50 feet in length shall be anchored to the wall or the supporting construction about midway on the run to force expansion, evenly divided, toward the ends. Sufficient flexibility shall be provided on branch runouts from mains and risers to provide for expansion and contraction of piping. Flexibility shall be provided by installing one or more turns in the line so that piping will spring enough to allow for expansion without straining. If mechanical grooved pipe coupling systems are provided, the deviation from design requirements for expansion and contraction may be allowed pending approval of Contracting Officer.

3.1.1.7 Commercial-Type Water Hammer Arresters

Commercial-type water hammer arresters shall be provided on hot- and cold-water supplies and shall be located as generally indicated, with precise location and sizing to be in accordance with PDI WH 201. Water hammer arresters, where concealed, shall be accessible by means of access doors or removable panels. Commercial-type water hammer arresters shall conform to PDI WH 201. Vertical capped pipe columns will not be permitted.

3.1.2 Joints

Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Joints shall be made up with fittings of compatible material and made for the specific purpose intended.

3.1.2.1 Threaded

Threaded joints shall have American Standard taper pipe threads conforming to ASME B1.20.1. Only male pipe threads shall be coated with an approved thread sealant compound.

3.1.2.2 Unions

Unions shall not be concealed in walls, ceilings, or partitions. Unions shall be used on pipe sizes 2-1/2 inches and smaller.

3.1.2.3 Cast Iron Soil, Waste and Vent Pipe

Bell and spigot compression and hubless gasketed clamp joints for soil, waste and vent piping shall be installed per the manufacturer's recommendations.

3.1.2.4 Copper Tube and Pipe

The tube or fittings shall not be annealed when making connections.

- a. Brazed. Brazed joints shall be made in conformance with AWS B2.2,

MSS SP-73, and CDA Tube A 4015 with flux and are acceptable for all pipe sizes. Copper to copper joints shall include the use of copper-phosphorus or copper-phosphorus-silver brazing metal without flux. Brazing of dissimilar metals (copper to bronze or brass) shall include the use of flux with either a copper-phosphorus, copper-phosphorus-silver or a silver brazing filler metal.

- b. Soldered. Soldered joints shall be made with flux and are only acceptable for piping 2 inches and smaller. Soldered joints shall conform to ASME B31.5 and CDA Tube A 4015. Soldered joints shall not be used in compressed air piping between the air compressor and the receiver. No lead shall be used on joints in potable water piping.
- c. Copper Tube Extracted Joint. An extracted mechanical joint may be made in copper tube. Joint shall be produced with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, dimpled depth stops shall be provided. Branch tube shall be notched for proper penetration into fitting to assure a free flow joint. Extracted joints shall be brazed in accordance with NAPHCC Plumbing Code using B-cup series filler metal in accordance with MSS SP-73. Soldered extracted joints will not be permitted.

3.1.2.5 Plastic Pipe

PVC pipe shall have joints made with solvent cement.

3.1.2.6 Other Joint Methods

3.1.3 Dissimilar Pipe Materials

Connections between ferrous and non-ferrous copper water pipe shall be made with dielectric unions or flange waterways. Dielectric waterways shall have temperature and pressure rating equal to or greater than that specified for the connecting piping. Waterways shall have metal connections on both ends suited to match connecting piping. Dielectric waterways shall be internally lined with an insulator specifically designed to prevent current flow between dissimilar metals. Dielectric flanges shall meet the performance requirements described herein for dielectric waterways. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

3.1.4 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

3.1.4.1 Sleeve Requirements

Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. Sleeves are not required for supply, drainage, waste and vent pipe passing through concrete slab on grade, except where penetrating a membrane waterproof floor. A modular mechanical type sealing assembly may be installed in lieu of a waterproofing clamping flange and caulking

and sealing of annular space between pipe and sleeve. The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve using galvanized steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe and sleeve involved. Sleeves shall not be installed in structural members, except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its respective floor, or roof, and shall be cut flush with each surface, except for special circumstances. Pipe sleeves passing through floors in wet areas such as mechanical equipment rooms, lavatories, kitchens, and other plumbing fixture areas shall extend a minimum of 4 inches above the finished floor. Unless otherwise indicated, sleeves shall be of a size to provide a minimum of 1/4 inch clearance between bare pipe or insulation and inside of sleeve or between insulation and inside of sleeve. Sleeves in bearing walls and concrete slab on grade floors shall be steel pipe or cast-iron pipe. Sleeves in nonbearing walls or ceilings may be steel pipe, cast-iron pipe, galvanized sheet metal with lock-type longitudinal seam, or plastic. Except as otherwise specified, the annular space between pipe and sleeve, or between jacket over insulation and sleeve, shall be sealed as indicated with sealants conforming to ASTM C 920 and with a primer, backstop material and surface preparation as specified in Section 07900A JOINT SEALING. The annular space between pipe and sleeve, between bare insulation and sleeve or between jacket over insulation and sleeve shall not be sealed for interior walls which are not designated as fire rated. Sleeves through below-grade walls in contact with earth shall be recessed 1/2 inch from wall surfaces on both sides. Annular space between pipe and sleeve shall be filled with backing material and sealants in the joint between the pipe and concrete, or masonry wall as specified above. Sealant selected for the earth side of the wall shall be compatible with dampproofing/waterproofing materials that are to be applied over the joint sealant.

3.1.4.2 Flashing Requirements

Pipes passing through roof shall be installed through a 16 ounce copper flashing, each within an integral skirt or flange. Flashing shall be suitably formed, and the skirt or flange shall extend not less than 8 inches from the pipe and shall be set over the roof or floor membrane in a solid coating of bituminous cement. The flashing shall extend up the pipe a minimum of 10 inches. For cleanouts, the flashing shall be turned down into the hub and caulked after placing the ferrule. Pipes passing through pitched roofs shall be flashed, using lead or copper flashing, with an adjustable integral flange of adequate size to extend not less than 8 inches from the pipe in all directions and lapped into the roofing to provide a watertight seal. The annular space between the flashing and the bare pipe or between the flashing and the metal-jacket-covered insulation shall be sealed as indicated. Flashing for dry vents shall be turned down into the pipe to form a waterproof joint. Pipes, up to and including 10 inches in diameter, passing through roof or floor waterproofing membrane may be installed through a cast-iron sleeve with caulking recess, anchor lugs, flashing-clamp device, and pressure ring with brass bolts. Flashing shield shall be fitted into the sleeve clamping device. Pipes passing through wall waterproofing membrane shall be sleeved as described above. A waterproofing clamping flange shall be installed.

3.1.4.3 Waterproofing

Waterproofing at floor-mounted water closets shall be accomplished by forming a flashing guard from soft-tempered sheet copper. The center of the sheet shall be perforated and turned down approximately 1-1/2 inches to fit between the outside diameter of the drainpipe and the inside diameter of the cast-iron or steel pipe sleeve. The turned-down portion of the flashing guard shall be embedded in sealant to a depth of approximately 1-1/2 inches; then the sealant shall be finished off flush to floor level between the flashing guard and drainpipe. The flashing guard of sheet copper shall extend not less than 8 inches from the drainpipe and shall be lapped between the floor membrane in a solid coating of bituminous cement. If cast-iron water closet floor flanges are used, the space between the pipe sleeve and drainpipe shall be sealed with sealant and the flashing guard shall be upturned approximately 1-1/2 inches to fit the outside diameter of the drainpipe and the inside diameter of the water closet floor flange. The upturned portion of the sheet fitted into the floor flange shall be sealed.

3.1.4.4 Pipe Penetrations of Slab on Grade Floors

Where pipes, fixture drains, floor drains, cleanouts or similar items penetrate slab on grade floors, except at penetrations of floors with waterproofing membrane as specified in paragraphs Flashing Requirements and Waterproofing, a groove 1/4 to 1/2 inch wide by 1/4 to 3/8 inch deep shall be formed around the pipe, fitting or drain. The groove shall be filled with a sealant as specified in Section 07900A JOINT SEALING.

3.1.5 Supports

3.1.5.1 General

Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. Piping subjected to vertical movement when operating temperatures exceed ambient temperatures shall be supported by variable spring hangers and supports or by constant support hangers. In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run. Threaded sections of rods shall not be formed or bent.

3.1.5.2 Pipe Supports and Structural Bracing

Structural steel required for reinforcement to properly support piping, headers, and equipment, but not shown, shall be provided. Material used for supports shall be as specified in Section 05120 STRUCTURAL STEEL.

3.1.5.3 Pipe Hangers, Inserts, and Supports

Installation of pipe hangers, inserts and supports shall conform to MSS SP-58 and MSS SP-69, except as modified herein.

- a. Types 5, 12, and 26 shall not be used.

- b. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and shall have both locknuts and retaining devices furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.
- c. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. Operating temperatures in determining hanger spacing for PVC pipe shall be 120 degrees F. Horizontal pipe runs shall include allowances for expansion and contraction.
- d. Vertical pipe shall be supported at each floor, except at slab-on-grade, at intervals of not more than 15 feet nor more than 8 feet from end of risers, and at vent terminations. Vertical pipe risers shall include allowances for expansion and contraction.
- e. Pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation. The insulation shall be continuous through the hanger on all pipe sizes and applications.
- f. Hangers and supports for plastic pipe shall not compress, distort, cut or abrade the piping, and shall allow free movement of pipe except where otherwise required in the control of expansion/contraction.

3.1.6 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. A cleanout installed in connection with cast-iron soil pipe shall consist of a long-sweep 1/4 bend or one or two 1/8 bends extended to the place shown. An extra-heavy cast-brass or cast-iron ferrule with countersunk cast-brass head screw plug shall be caulked into the hub of the fitting and shall be flush with the floor. Cleanouts in connection with other pipe, where indicated, shall be T-pattern, 90-degree branch drainage fittings with cast-brass screw plugs, except plastic plugs shall be installed in plastic pipe. Plugs shall be the same size as the pipe up to and including 4 inches. Cleanout tee branches with screw plug shall be installed at the foot of soil and waste stacks, at the foot of interior downspouts, on each connection to building storm drain where interior downspouts are indicated, and on each building drain outside the building. Cleanout tee branches may be omitted on stacks in single story buildings with slab-on-grade construction or where less than 18 inches of crawl space is provided under the floor. Cleanouts on pipe concealed in partitions shall be provided with chromium plated bronze, nickel bronze, nickel brass or stainless steel flush type access cover plates. Round access covers shall be provided and secured to plugs with securing screw. Square access covers may be provided with matching frames, anchoring lugs and cover screws. Cleanouts in finished walls shall have access covers and frames installed flush with the finished wall. Cleanouts installed in finished floors subject to foot traffic shall be provided with a chrome-plated cast brass, nickel brass, or nickel bronze cover secured to the plug or cover frame and set flush with the finished floor. Heads of fastening screws shall not project above the cover surface. Where cleanouts are provided with adjustable heads, the heads shall be cast iron or plastic.

3.2 WATER HEATERS AND HOT WATER STORAGE TANKS

3.2.1 Relief Valves

No valves shall be installed between a relief valve and its water heater. The P&T relief valve shall be installed where the valve actuator comes in contact with the hottest water in the heater. Whenever possible, the relief valve shall be installed directly in a tapping in the tank or heater; otherwise, the P&T valve shall be installed in the hot-water outlet piping. A vacuum relief valve shall be provided on the cold water supply line to the hot-water storage tank or water heater and mounted above and within 6 inches above the top of the tank or water heater where required.

3.2.2 Connections to Water Heaters

Connections of metallic pipe to water heaters shall be made with dielectric unions or flanges.

3.2.3 Expansion Tank

A pre-charged expansion tank shall be installed on the cold water supply between the water heater inlet and the cold water supply shut-off valve where required. The Contractor shall adjust the expansion tank air pressure, as recommended by the tank manufacturer, to match incoming water pressure.

3.3 FIXTURES AND FIXTURE TRIMMINGS

Polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock-shield, and loose-key pattern stops for supplies with threaded, sweat or solvent weld inlets shall be furnished and installed with fixtures. Where connections between copper tubing and faucets are made by rubber compression fittings, a beading tool shall be used to mechanically deform the tubing above the compression fitting. Exposed traps and supply pipes for fixtures and equipment shall be connected to the rough piping systems at the wall, unless otherwise specified under the item. Floor and wall escutcheons shall be as specified. Drain lines and hot water lines of fixtures for handicapped personnel shall be insulated and do not require polished chrome finish. Plumbing fixtures and accessories shall be installed within the space shown.

3.3.1 Fixture Connections

Connections between earthenware fixtures and flanges on soil and PVC pipe shall be made gastight and watertight with a closet-setting compound or neoprene gasket and seal. Use of natural rubber gaskets or putty will not be permitted. Fixtures with outlet flanges shall be set the proper distance from floor or wall to make a first-class joint with the closet-setting compound or gasket and fixture used.

3.3.2 Flushometer Valves

Flushometer valves shall be secured to prevent movement by anchoring the long finished top spud connecting tube to wall adjacent to valve with approved metal bracket. Flushometer valves for water closets shall be installed 39 inches above the floor, except at water closets intended for use by the physically handicapped where flushometer valves shall be mounted at approximately 30 inches above the floor and arranged to avoid interference with grab bars. In addition, for water closets intended for

handicap use, the flush valve handle shall be installed on the wide side of the enclosure. Bumpers for water closet seats shall be installed on the wall.

3.3.3 Height of Fixture Rims Above Floor

Wall-hung lavatories shall be mounted with rim 31 inches above finished floor. Self rimming lavatories shall be mounted per handicap requirements.

Lavatories in vanities shall be mounted 36 inches above finished floor to top of vanity. Wall-hung drinking fountains and water coolers shall be installed with rim 42 inches above floor. Wall-hung service sinks shall be mounted with rim 28 inches above the floor. Installation of fixtures for use by the physically handicapped shall be in accordance with CABO A117.1.

3.3.4 Fixture Supports

Fixture supports for off-the-floor lavatories, urinals, and other fixtures of similar size, design, and use, shall be of the chair-carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure only where it is not possible to anchor a floor-mounted chair carrier to the floor slab.

3.3.4.1 Support for Solid Masonry Construction

Chair carrier shall be anchored to the floor slab. Where a floor-anchored chair carrier cannot be used, a suitable wall plate shall be imbedded in the masonry wall.

3.3.4.2 Support for Concrete-Masonry Wall Construction

Chair carrier shall be anchored to floor slab. Where a floor-anchored chair carrier cannot be used, a suitable wall plate shall be fastened to the concrete wall using through bolts and a back-up plate.

3.3.4.3 Support for Steel Stud Frame Partitions

Chair carrier shall be used. The anchor feet and tubular uprights shall be of the heavy duty design; and feet (bases) shall be steel and welded to a square or rectangular steel tube upright. Wall plates, in lieu of floor-anchored chair carriers, shall be used only if adjoining steel partition studs are suitably reinforced to support a wall plate bolted to these studs.

3.3.4.4 Support for Wood Stud Construction

Where floor is a concrete slab, a floor-anchored chair carrier shall be used. Where entire construction is wood, wood crosspieces shall be installed. Fixture hanger plates, supports, brackets, or mounting lugs shall be fastened with not less than No. 10 wood screws, 1/4 inch thick minimum steel hanger, or toggle bolts with nut. The wood crosspieces shall extend the full width of the fixture and shall be securely supported.

3.3.4.5 Installation of Water Meters

Meters shall be installed at the locations shown on the drawings. Meters shall be installed in accordance with manufacturer's recommendation or as

shown on plans. Water meter output cable shall connect to First Point Inc's Meter Interface Unit. A communication cable (3-conductor, 22 AWG) shall be routed from meter to the MIU through appropriate sized conduit. Approximately 1-2 feet of cable shall be provided at both ends for final connection (termination) by DPW Energy Team.

3.3.5 Access Panels

Access panels shall be provided for concealed valves and controls, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced. Access panels shall be as specified in Section 05500A MISCELLANEOUS METAL.

3.3.6 Sight Drains

Sight drains shall be installed so that the indirect waste will terminate 2 inches above the flood rim of the funnel to provide an acceptable air gap.

3.3.7 Traps

Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Traps installed on steel pipe or copper tubing shall be recess-drainage pattern, or brass-tube type. Traps installed on plastic pipe may be plastic conforming to ASTM D 3311. Traps for acid-resisting waste shall be of the same material as the pipe.

3.4 WATER METER REMOTE READOUT REGISTER

The remote readout register shall be mounted at the location indicated or as directed by the Contracting Officer.

3.5 IDENTIFICATION SYSTEMS

3.5.1 Identification Tags

Identification tags made of brass, engraved laminated plastic, or engraved anodized aluminum, indicating service and valve number shall be installed on valves, except those valves installed on supplies at plumbing fixtures. Tags shall be 1-3/8 inch minimum diameter, and marking shall be stamped or engraved. Indentations shall be black, for reading clarity. Tags shall be attached to valves with No. 12 AWG, copper wire, chrome-plated beaded chain, or plastic straps designed for that purpose.

3.5.2 Pipe Color Code Marking

Color code marking of piping shall be as specified in Section 09900 PAINTS AND COATINGS.

3.6 ESCUTCHEONS

Escutcheons shall be provided at finished surfaces where bare or insulated piping, exposed to view, passes through floors, walls, or ceilings, except in boiler, utility, or equipment rooms. Escutcheons shall be fastened securely to pipe or pipe covering and shall be satin-finish, corrosion-resisting steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or setscrew.

3.7 PAINTING

Painting of pipes, hangers, supports, and other iron work, either in concealed spaces or exposed spaces, is specified in Section 09900 PAINTS AND COATINGS.

3.8 TESTS, FLUSHING AND DISINFECTION

3.8.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with ICC International Plumbing Code.

- a. Drainage and Vent Systems Test. The final test shall include a smoke test.
- b. Building Sewers Tests.
- c. Water Supply Systems Tests.

3.8.2 Defective Work

If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials. Caulking of screwed joints or holes will not be acceptable.

3.8.3 System Flushing

3.8.3.1 During Flushing

Before operational tests or disinfection, potable water piping system shall be flushed with potable water. Sufficient water shall be used to produce a water velocity that is capable of entraining and removing debris in all portions of the piping system. This requires simultaneous operation of all fixtures on a common branch or main in order to produce a flushing velocity of approximately 4 fps through all portions of the piping system. In the event that this is impossible due to size of system, the Contracting Officer (or the designated representative) shall specify the number of fixtures to be operated during flushing. Contractor shall provide adequate personnel to monitor the flushing operation and to ensure that drain lines are unobstructed in order to prevent flooding of the facility. Contractor shall be responsible for any flood damage resulting from flushing of the system. Flushing shall be continued until entrained dirt and other foreign materials have been removed and until discharge water shows no discoloration.

3.8.3.2 After Flushing

System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced. After flushing and cleaning, systems shall be prepared for testing by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor. When the system flushing is complete, the hot-water system shall be adjusted for uniform circulation. Flushing devices and automatic control systems shall be adjusted for proper operation. All faucets and drinking water fountains, to include any device considered as an end point device by NSF 61,

Section 9, shall be flushed a minimum of 0.25 gallons per 24 hour period, ten times over a 14 day period.

3.8.4 Operational Test

Upon completion of flushing and prior to disinfection procedures, the Contractor shall subject the plumbing system to operating tests to demonstrate satisfactory functional and operational efficiency. Such operating tests shall cover a period of not less than 8 hours for each system and shall include the following information in a report with conclusion as to the adequacy of the system:

- a. Time, date, and duration of test.
- b. Water pressures at the most remote and the highest fixtures.
- c. Operation of each fixture and fixture trim.
- d. Operation of each valve, hydrant, and faucet.
- e. Temperature of each domestic hot-water supply.
- f. Operation of each floor and roof drain by flooding with water.
- g. Operation of each vacuum breaker and backflow preventer.

3.8.5 Disinfection

After operational tests are complete, the entire domestic hot- and cold-water distribution system shall be disinfected. System shall be flushed as specified, before introducing chlorinating material. The chlorinating material shall be hypochlorites or liquid chlorine. Water chlorination procedure shall be in accordance with AWWA M20. The chlorinating material shall be fed into the water piping system at a constant rate at a concentration of at least 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the main with a hypochlorinator, or liquid chlorine injected into the main through a solution-feed chlorinator and booster pump, shall be used. The chlorine residual shall be checked at intervals to ensure that the proper level is maintained. Chlorine application shall continue until the entire main is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system being disinfected shall be opened and closed several times during the contact period to ensure its proper disinfection. Following the 24-hour period, no less than 25 ppm chlorine residual shall remain in the system. If after the 24 hour holding period, the residual solution contains less than 25 ppm chlorine, flush the piping with potable water and repeat the above procedures until the required residual chlorine levels are satisfied. The system shall then be flushed with clean water until the residual chlorine level is reduced to less than one part per million. During the flushing period each valve and faucet shall be opened and closed several times. Samples of water in disinfected containers shall be obtained from several locations selected by the Contracting Officer. The samples of water shall be tested for total coliform organisms (coliform bacteria, fecal coliform, streptococcal, and other bacteria) in accordance with AWWA EWW. The testing method used shall be either the multiple-tube fermentation technique or the membrane-filter technique. Disinfection shall be repeated until tests indicate the absence of coliform organisms (zero mean coliform density per 100 milliliters) in the samples for at least 2 full days. The system will not be accepted until satisfactory

bacteriological results have been obtained.

3.9 PLUMBING FIXTURE SCHEDULE

P-1A WATER CLOSET: vitreous china, ASME A112.19.2M, 1-piece, elongated bowl, 1.6 gallons per flush, 1-1/2 inch top spud, white color with seat, Kohler Wellcomme model no. K-4350 or approved equal.

[AM#0002]

Flushometer Valve - ASSE 1037, large diaphragm type with non-hold-open feature, backcheck angle control stop, and vacuum breaker. Minimum upper chamber inside diameter of not less than 2-5/8 inches at the point where the diaphragm is sealed between the upper and lower chambers. The maximum water use shall be 1.6 gallons per flush.

P-1B WATER CLOSET: vitreous china, ASME A112.19.2M, 2-piece, elongated bowl, 1.6 gallons per flush, polished chrome trip lever, white color, w/seat, Kohler Wellworth model no. K-3458 or approved equal with flush tank.

P-2 WATER CLOSET: handicapped, vitreous china, ASME A112.19.2M, 1-piece, elongated bowl, 1.6 gallons per flush, 1-1/2" top spud, white color, w/seat, 16-1/2" high bowl for ADA compliance in accordance with CABO A117.1, Kohler Highcrest model no. K-4302 or approved equal.

[AM#0002]

Flushometer Valve - ASSE 1037, large diaphragm type with non-hold-open feature, backcheck angle control stop, and vacuum breaker. Minimum upper chamber inside diameter of not less than 2-5/8 inches at the point where the diaphragm is sealed between the upper and lower chambers. The maximum water use shall be 1.6 gallons per flush.

All water closets shall be siphon-jet, elongated bowl, top supply spud, floor mounted. Floor flange shall be cast iron, or plastic. ADA compliant where required.

Floor flange gasket shall be wax type.

Seat shall be IAPMO Z124.5, Type A, white plastic, elongated, open front.

Flush Tank - An adequate quantity of water shall be provided to flush and clean the fixture served. The water supply to flush tanks equipped for manual flushing shall be controlled by a float valve or other automatic device designed to refill the tank after each discharge, and to completely shut off the water flow to the tank when the tank is filled to operational capacity. Water closets having their flush valve seat located below the flood level rim of the closet bowl shall have a ballcock installed within a sheath or in a separate and isolated compartment of the tank, both to have visible discharge onto the floor in case of failure. Provision shall be made to automatically supply water to the fixture so as to refill the trap seal after each flushing. The water supply to flush tanks equipped for automatic flushing shall be controlled by a suitable timing device. Ballcocks shall meet ASSE 1002.

P-3 URINAL: vitreous china, ASME A112.19.2M, blow-out type, 1-1/4" top spud, 1.0 gallon flush, ADA compliant when rim is mounted no more than 17" from floor, white color, for 1-1/4" flush valve, Kohler Stanwell model no. K-4972-t or approved equal with flushometer similar to P-1A above.

Vitreous china urinal shall be in accordance with ASME A112.19.2M and ANSI

A117.1. Fixture shall be a waterless/waterfree, non-flushing type, with replaceable trap insert. The replaceable trap insert shall contain a low specific gravity immiscible barrier liquid. The liquid shall be biodegradable. The urinal and trap assembly shall maintain a sufficient barrier of immiscible liquid necessary to inhibit backflow of sewer gases.

[AM#0002]

Flushometer Valve - Similar to Flushometer Valve for P-1A. The maximum water use shall be 1 gallon per flush.

P-5A LAVATORY: cast iron, ASME A112.19.1M, self-rimming, holes on 4" centers for faucet attachment, white color, with overflow, Kohler Farmington model number K-2905-4 or approved equal.

[AM#0002]

Faucet - Faucets shall meet the requirements of NSF 61, Section 9. Faucets shall be single control, mixing type. Faucets shall have metal replaceable cartridge control unit or metal cartridge units with diaphragm which can be replaced without special tools. Valves and handles shall be copper alloy. Connection between valve and spout for center-set faucet shall be of rigid metal tubing. Flow shall be limited to 0.25 gallon per cycle at a flowing water pressure of 80 psi if a metering device or fitting is used that limits the period of water discharge such as a foot switch or fixture occupancy sensor. If a metering device is not used, the flow shall be limited to 2.5 gpm at a flowing pressure of 80 psi.

Handles - Lever type. Cast, formed, or drop forged copper alloy.

Drain - Strainer shall be copper alloy or stainless steel. Pop-up drain shall include stopper, lift rods, jam nut, washer, and tail piece. See paragraph FIXTURES for optional plastic accessories.

P-5B LAVATORY: vitreous china, ASME A112.19.2M, ledge back, holes on 4" centers for faucet attachment, with overflow, with carrier, Kohler Kingston model number K-2005 or approved equal.

[AM#0002]

Faucet - Faucets shall meet the requirements of NSF 61, Section 9. Faucets shall be single control, mixing type. Faucets shall have metal replaceable cartridge control unit or metal cartridge units with diaphragm which can be replaced without special tools. Valves and handles shall be copper alloy. Connection between valve and spout for center-set faucet shall be of rigid metal tubing. Flow shall be limited to 0.25 gallon per cycle at a flowing water pressure of 80 psi if a metering device or fitting is used that limits the period of water discharge such as a foot switch or fixture occupancy sensor. If a metering device is not used, the flow shall be limited to 2.5 gpm at a flowing pressure of 80 psi.

Handles - Lever type. Cast, formed, or drop forged copper alloy.

Drain - Strainer shall be copper alloy or stainless steel. Pop-up drain shall include stopper, lift rods, jam nut, washer, and tail piece. See paragraph FIXTURES for optional plastic accessories.

P-7A UTILITY SINK: 20 gauge, type 302 (18-8) nickel bearing stainless steel, ASME A112.19.3M, self-rimming, 7" depth, coved corners, machine polished finish, undercoated, 3-1/2" drain opening, 4-hole, Elkay Manufacturing model no. CR-2521-4 or approved equal.

[AM#0002]

Faucet - Faucets shall meet the requirements of NSF 61, Section 9. Faucets shall be single control, mixing type. Faucets shall have metal replaceable cartridge control unit or metal cartridge units with diaphragm which can be replaced without special tools. Valves and handles shall be copper alloy. Connection between valve and spout for center-set faucet shall be of rigid metal tubing. Flow shall be limited to 0.25 gallon per cycle at a flowing water pressure of 80 psi if a metering device or fitting is used that limits the period of water discharge such as a foot switch or fixture occupancy sensor. If a metering device is not used, the flow shall be limited to 2.5 gpm at a flowing pressure of 80 psi.

Handles - Lever type. Cast, formed, or drop forged copper alloy.

Drain - Strainer shall be copper alloy or stainless steel. Pop-up drain shall include stopper, lift rods, jam nut, washer, and tail piece. See paragraph FIXTURES for optional plastic accessories.

P-7B UTILITY SINK: 20 gauge, type 304 (18-8) nickel bearing stainless steel, ASME A112.19.3M, self-rimming, coved corners, machine polished finish, undercoated, 2" drain opening, 2-hole, Elkay Manufacturing model no. BCR-15 or approved equal.

[AM#0002]

Faucet - Faucets shall meet the requirements of NSF 61, Section 9. Faucets shall be combination type. Faucets shall have replaceable seats and washers. Valves and handles shall be copper alloy. Connection between valve and spout for center-set faucet shall be of rigid metal tubing. Flow shall be limited to 0.25 gallon per cycle at a flowing water pressure of 80 psi if a metering device or fitting is used that limits the period of water discharge such as a foot switch or fixture occupancy sensor. If a metering device is not used, the flow shall be limited to 2.5 gpm at a flowing pressure of 80 psi.

Handles - Crown type. Cast, formed, or drop forged copper alloy.

Drain - Strainer shall be copper alloy or stainless steel. Pop-up drain shall include stopper, lift rods, jam nut, washer, and tail piece. See paragraph FIXTURES for optional plastic accessories.

P-8 CORNER MOP SINK: one piece construction, precast terrazzo, w/integral drain and removable stainless steel grid strainer, Acorn Engineering Company Terrazzo-Ware model no. TNC-24-TF2 or approved equal.

[AM#0002]

Faucet and Spout - Cast or wrought copper alloy, with top or bottom brace, with backflow preventer. Faucets shall have replaceable seat and the washer shall rotate onto the seat. Handles shall be lever type. Strainers shall have internal threads.

Drain Assembly - Plug, cup strainer, crossbars, jam nuts, washers, couplings, stopper, etc., shall be copper alloy or stainless steel.

P-15A WATER COOLER DRINKING FOUNTAIN: push button operated, stainless steel top, flexible bubbler guard, low inlet p-trap, R-134A refrigerant, 8 gph capacity of 50°F water at 90°F ambient air temperature, Oasis model no. PLF8SKPE or approved equal.

P-15B WATER COOLER DRINKING FOUNTAIN: bi-level, stainless steel top,

flexible bubbler guard, R-134A refrigerant, push pad activation, 8 gph capacity of 50°F water at 90°F ambient air temperature, Oasis model no. P8AMSL or approved equal.

Drinking fountains shall meet the requirements of NSF 61, Section 9. Water cooler drinking fountains shall: be self contained, conform to ARI 1010, use one of the fluorocarbon gases conforming to ARI 700 and ASHRAE 34 which has an Ozone Depletion Potential of less than or equal to 0.05, have a capacity to deliver 8 gph of water at 50 degrees F with an inlet water temperature of 80 degrees F while residing in a room environment of 90 degrees F, and have self-closing valves. Self-closing valves shall have automatic stream regulators, have a flow control capability, have a push button actuation or have a cross-shaped index metal turn handle without a hood. Exposed surfaces of stainless steel shall have No. 4 general polish finish. Spouts shall provide a flow of water at least 4 inches high so as to allow the insertion of a cup or glass under the flow of water.

P-20 FLOOR DRAIN: cast iron adjustable floor drain with flange, 1/2" primer tap, integral reversible clamping collar, seepage openings, 5" diameter nickel bronze strainer with vandal proof screws, 3" size, Wade part number 1103STD5 or approved equal.

P-21 FLOOR DRAIN: square, cast iron adjustable floor drain with flange, plugged 1/2" primer tap, integral clamping collar and square loose-set ductile iron grate with anti-tilt lugs, 4" size, Wade part number 2344TY or approved equal.

P-22 FLOOR CLEANOUT: cast iron with adjustable housing, ferrule with tapered brass plug and round secured nickel bronze scoriated top, sv hub outlet w/gasket to fit PVC or cast iron pipe as required, size as required, light duty, wade part number 6004ty-1 or approved equal.

P-23 EXTERIOR CLEANOUT: cast iron with adjustable housing, with gas and watertight abs tapered thread plug and round secured nickel bronze scoriated heavy duty top, sv hub outlet w/gasket to fit cast iron pipe, size as required, heavy duty, Zurn part number Z1400NL or approved equal.

P-24 WALL CLEANOUT: cast iron tee with spigot inlet and outlet and threaded brass countersunk plug drilled and tapped for 1/4-20 screw, with round stainless steel access cover w/ 1/4-20x3-1/2 center screw, Wade part no. 8560e or approved equal.

P-25 FLOOR CLEANOUT: cast iron with threaded adjustable housing, flanged ferrule with tapered brass plug and round scoriated cast iron or with nickel bronze veneer tractor type cover, sv hub outlet w/gasket to fit 4" PVC pipe, 4" size, special duty class (over 10,000 lbs), Wade part number 6004ZTY or approved equal.

P-26 WATER HEATER: 20 gal. capacity, 240v ac, single phase non-simultaneous wiring, 4500 watt upper and lower heating elements, w/temperature and pressure relief valve, 21 gph recovery at 90°F rise, brass drain valve, Rheem model no. 81SV20D or approved equal.

P-27 WATER HEATER: 10 gal. capacity, 120v ac, 2000 watt single heating element, w/temperature & pressure relief valve, r-14.6, brass drain valve, Rheem model no. 81VP10S or approved equal.

P-28 WATER HEATER: 6 gal. capacity, 120v ac, 2000 watt single heating element, w/temperature & pressure relief valve, r-14.6, brass drain valve,

Rheem model no. 81VP6S or approved equal.

P-29 YARD HYDRANT: 1" size, automatic draining, backflow protected, frostproof, 1-1/4" galvanized casing, 3' burial depth, Woodford model no. Y2 or approved equal.

P-30 WALL HYDRANT: 3/4" size, non-freeze type, w/straight inlet connection, anti-siphon backflow preventer, bronze casing and chrome plated bronze box, Zurn part no. Z1300 or approved equal.

P-31 WATER THERMAL EXPANSION TANK: 3/4" brass mnpt connection, 4.5 gallon volume, high grade steel w/epoxy finish, butyl rubber bladder, max. working pressure 150 psig, factory precharged to 40 psi, Wilkins model WXTTP-18 or approved equal.

P-32 WATER HAMMER ARRESTOR: type 304 stainless steel construction, 3/4" mnpt inlet, size 200, zurn part no. z1700 or approved equal.

P-33 LAVATORY FAUCET: for 4" centers, 2 gpm, polished chrome, Kohler Coralie model no. K-15182 or approved equal.

P-34 UTILITY SINK FAUCET: metal construction, for 4" centers, 4" gooseneck spout, 2.2 gpm, blade handles, polished chrome, Kohler Trend model no. K-11933 or approved equal.

P-35 MOP SINK FAUCET: brass construction, for 8" centers, brass valve bodies, 4-5/8" threaded spout, internal npt connections, lever handles, vacuum breaker, pail hook, wall brace, polished chrome, Kohler model no. K-8907 or approved equal.

P-36 WATER METER: 2" size, oval flange ends, positive displacement type, for cold water service, bronze case, magnetic drive, with straight reading register in US gallons, register type shall be an encoder type remote register, with output cable to connect to meter interface unit, Kent model LM2000VR or approved equal.

P-37A WATER PRESSURE REGULATING VALVE: high capacity, 3/4" female connections, bronze, with strainer, max. pressure 300 psi, max. temperature 160°F, Watts Regulator series 223 or approved equal.

P-37B WATER PRESSURE REGULATING VALVE: high capacity, 2" female connections, bronze, with strainer, max. pressure 300 psi, max. temperature 160°F, Watts Regulator series 223 or approved equal.

P-38 WATER CLOSET FLUSH VALVE: automatic flushing, 1" supply, 1-1/2" vacuum breaker tube, diaphragm type, chrome plated, battery powered sensor, 1.6 gallon flush, Zurn model no. ZER600AV-CPM-WS1 or approved equal.

P-39 URINAL FLUSH VALVE: automatic flushing, 1" supply, 1-1/4" vacuum breaker tube, diaphragm type, chrome plated, battery powered sensor, 1.6 gallon flush, Zurn model no. ZER600AV-CPM-WS1 or approved equal.

P-40 UTILITY SINK FAUCET: metal construction, single lever type, 10" swing spout, 2.2 gpm, with handspray, polished chrome, Kohler model no. K-15172-tt or approved equal.

P-41 ICE MAKER VALVE BOX: powder coated 20 guage steel, slimline profile with MIP x 1/4" compression valve, quarter-turn operation, LSR Products Group part number OB-504 or approved equal.

P-42 FLOOR DRAIN: cast iron with integral clamping collar with stainless steel indirect waste drain funnel, Wade model number 1302TD-NH-EF4 or approved equal.

3.10 PERFORMANCE OF WATER HEATING EQUIPMENT

Standard rating condition terms are as follows:

EF = Energy factor, overall efficiency.

ET = Thermal efficiency with 70 degrees F delta T.

SL = Standby loss in W/sq. ft. based on 80 degrees F delta T, or in percent per hour based on nominal 90 degrees F delta T.

HL = Heat loss of tank surface area.

V = Storage volume in liters

3.10.1 Storage Water Heaters

3.10.1.1 Electric

- a. Storage capacity of 120 gallons or less, and input rating of 12 kW or less: minimum energy factor (EF) shall be 0.95-0.00132V per 10 CFR 430.

3.11 TABLES

TABLE I
 PIPE AND FITTING MATERIALS FOR
 DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

		SERVICE					
Item #	Pipe and Fitting Materials	A	B	C	D	E	F
1	Cast iron soil pipe and fittings, hub and spigot, ASTM A 74 with compression gaskets	X	X	X	X	X	
2	Cast iron soil pipe and fittings hubless, CISPI 301 and ASTM A 888		X	X	X	X	
3	Cast iron drainage fittings, threaded, ASME B16.12 for use with Item 10	X		X	X		
4	Malleable-iron threaded fittings, galvanized ASME B16.3 for use with Item 10				X	X	
5	Steel pipe, seamless galvanized, ASTM A 53/A 53M, Type S, Grade B	X			X	X	
6	Polyvinyl Chloride plastic drain, waste and vent pipe and fittings, ASTM D 2665	X	X		X		

SERVICE:

- A - Underground Building Soil, Waste and Storm Drain
- B - Aboveground Soil, Waste, Drain In Buildings
- C - Underground Vent
- D - Aboveground Vent
- E - Interior Rainwater Conductors Aboveground
- F - Corrosive Waste And Vent Above And Belowground
- * - Hard Temper

TABLE II
 PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item No.	Pipe and Fitting Materials	SERVICE			
		A	B	C	D
1	Malleable-iron threaded fittings, Galvanized, ASME B16.3 for use with Item 4a	X	X	X	X
2	Steel pipe, Seamless, galvanized, ASTM A 53/A 53M, Type S, Grade B	X	X	X	X
3	Seamless red brass pipe, ASTM B 43	X	X		X
4	Seamless copper water tube, ASTM B 88	X**	X**	X**	X****
5	Cast bronze threaded fittings, ASME B16.15 for use with Items 5 and 7	X	X		X
6	Wrought copper and bronze solder-joint pressure fittings, ASME B16.22 for use with Items 5 and 7	X	X	X	X
7	Nipples, pipe threaded ASTM A 733	X	X	X	

A - Cold Water Aboveground

B - Hot Water 180 degrees F Maximum Aboveground

C - Compressed Air Lubricated

D - Cold Water Service Belowground

Indicated types are minimum wall thicknesses.

** - Type L - Hard

*** - Type K - Hard temper with brazed joints only or type K-soft temper without joints in or under floors

**** - In or under slab floors only brazed joints

TABLE III
STANDARD RATING CONDITIONS AND MINIMUM PERFORMANCE RATINGS FOR WATER HEATING
EQUIPMENT

A. STORAGE WATER HEATERS

FUEL	STORAGE CAPACITY GALLONS	INPUT RATING	TEST PROCEDURE	REQUIRED PERFORMANCE
Elect.	120 max.	12 kW max.	10 CFR 430	$EF = 0.95 - 0.00132V$ minimum

TERMS:

EF = Energy factor, overall efficiency.
ET = Thermal efficiency with 70 degrees F delta T.
V = Storage volume in gallons

-- End of Section --